

San Antonio District Bicycle Plan

Texas Department of Transportation



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Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Existing conditions have not been field-verified. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

If you have issues interpreting the content in this plan, we encourage you to reference the companion StoryMap which can be accessed at:

[District Bicycle Plan Pilot.](#)

In addition, you may also call 512-486-5977 to speak with a TxDOT representative who will be able to assist you with your question.



Glossary

The list below defines key terms as they are used throughout the San Antonio District Bicycle Plan (“Plan”).

- **At-Grade Highway:** Roadways on the State Highway System that operate on the same vertical level as non-highway, local roadways, with minimal physical separation that limits access.
- **Bicyclist:** This document uses the term bicyclists broadly to include people riding traditional bicycles and a wide variety of other human-powered devices that use typical bicycle facilities. This includes electric-assisted bicycles, recumbent bicycles, bicycles or tricycles adapted for use by those with disabilities, and many others.
- **Bicycle Tourism Trail (BTT):** Routes that TxDOT has recommended for inclusion in a statewide bicycle tourism network. They traverse urban and rural areas and include three types of segments: cross-state spines, connecting spurs, and regional routes.
- **Bikeway Design User Guide:** A user-friendly guide for the Bicycle Facilities section of the Roadway Design Manual (RDM).
- **Bikeway Development Priorities:** Segments along the on-system network that have one or more need locations and are scored based on context factors into three categories: opportunistic, proactive, and high-priority.
- **Bikeway Functions:** Designations that reflect potential types of users and journeys the route may support, such as whether a route connects children to local K-12 schools, or long-distance riders to recreational destinations. The bikeway functions include all-ages bikeway, daily-travel bikeway, long-distance bikeway, and basic bikeway.
- **Community Needs Working Group (CNWG):** A working group comprised of local and regional stakeholders from community-based organizations, affordable housing providers, educational institutions, and other agencies and organizations.
- **District:** One of the 25 TxDOT jurisdictions that oversee the construction and maintenance of state highways. Each district is composed of a grouping of adjacent counties.
- **Grade-Separated Highway, Limited-Access Highway:** Roadways on the State Highway System that operate with a degree of physical separation from local roadways. This separation may be vertical differences in height, separating the highway above or below local access.
- **Locally Identified Needs:** These segments and points indicate places where new or improved bikeways should be considered, drawing on local plans, TxDOT/partner input and public input.
- **Need Location:** An on-system location where there is a bicycling gap or existing bikeways are deficient in some way. Needs are both segments and points. Some are data-driven and others are identified in local plans or by stakeholder input.
- **On-System Transportation Network:** Roads owned, operated, and maintained by TxDOT and connected infrastructure elements such as on- and off-ramps, bridges, and tunnels.
- **Right-of-Way:** The designated area, typically communicated as a width, on and surrounding a roadway over which an agency such as TxDOT has jurisdiction.
- **State Highway System (SHS):** Legislatively designated highway network that supports the movement of people and goods across Texas. The Texas state highways includes a main network of Interstate Highways, U.S. Highways, state highways, business highways, loops, spurs, farm-to-market roads, park roads, ranch roads, and beltways. “On-system” refers to roadways that are part of the SHS.
- **Technical Working Group (TWG):** A working group comprised of local and regional experts who have a close understanding of the processes and technical conditions that inform bicycle planning in their areas.
- **Urbanized Area:** an incorporated city, or an unincorporated census-designated place with a population of at least 2,500.

Executive Summary



The San Antonio District Bicycle Plan presents a data- and community-driven set of priorities and guidance for Texas Department of Transportation (TxDOT) on-system highways that will meet the specific bicycling needs of the district. This plan provides:

- An analysis of existing bicycling needs that prevent people from being able to ride safely;
- A set of prioritized segments of TxDOT roadways;
- Designated bikeway functions for how bikeways are likely to be used; and
- Refinements to regional long-distance bicycling routes.

San Antonio District Today

The district, which is comprised of 12 counties (Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson) and over 2.6 million residents, is urban in the central city area and more rural near and outside of the Charles W. Anderson Loop (SL) 1604. The terrain and land use of the district is more hilly in the north and flatter and more industrial in the south. The City of San Antonio is the seventh largest in the country by population, and the second largest in Texas, boasting over 1.4 million residents. The City of San Antonio is a major employment and recreational hub with infrastructure such as the River Walk and multiple creek greenways that support active recreation. Relatively smaller cities and towns within the district maintain large populations, such as Guadalupe County with 177,000 residents, and show interest in expanding their internal active modes networks. The State Highway System (SHS) in the San Antonio District is a spoke-and-wheel design with the City of San Antonio at the center such that smaller and more rural areas primarily access central San Antonio via TxDOT roadways. The San Antonio District encompasses 4,314 miles of highways with varied access and comfort for bicycle travelers. These highways often act as main streets through the 87 cities, towns, and unincorporated places they connect to and pass through.

Due to the scale of these roads and the high levels of truck traffic, on-system highways that pass through town centers are common barriers to safe bicycling. Many highways in more urban environments have frontage roads that provide access to properties along the highway as well as move traffic on and off the highway. While frontage roads serve as critical routes through communities and provide access to local destinations, these roads also move high vehicle volumes at high speeds. The combined width of interstates and frontage roads present significant barriers to bicycle travel, including stressful crossing conditions.

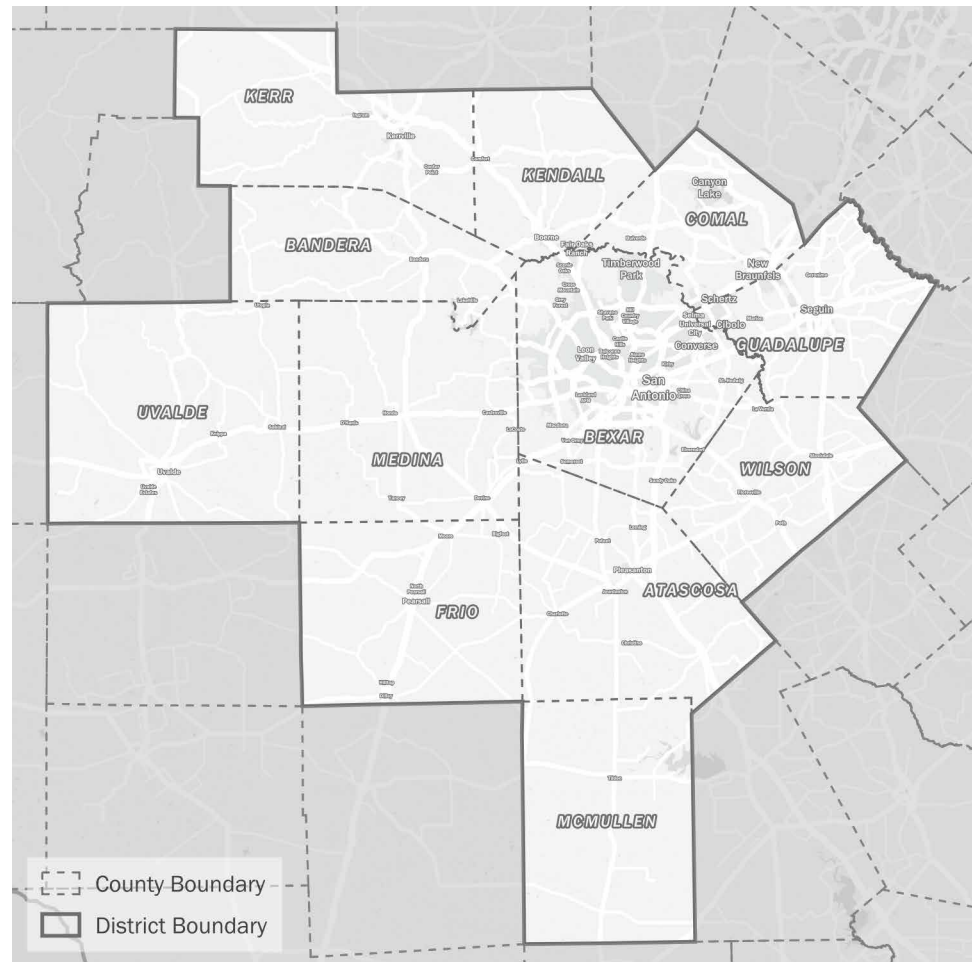


Figure 1. District Overview

Barriers to Bicycling

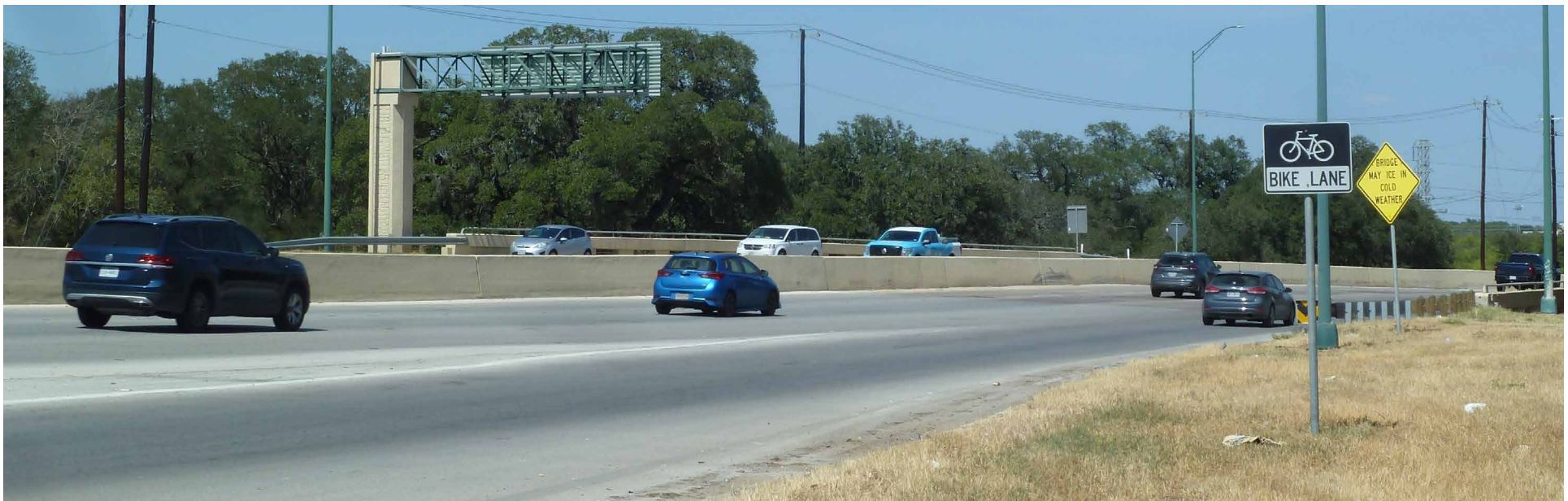
The most common factors that likely discourage bicycle trips on the TxDOT system are the lack of bikeways, uncomfortable roadways near school campuses, and existing bikeways that are stressful to ride. For the latter conditions, roadway designs such as high volumes, wide roadways, and narrow facilities that lack separation between modes contribute to high-stress conditions. This may occur, for example, on the district's rural highways with narrow shoulders or in urban areas with high traffic.

Results from an online community survey and feedback from local stakeholders identified areas along the SHS and on connecting streets where conditions felt unsafe or facilities were inadequate. Respondents commonly identified segments with high traffic speeds and volumes as contributing to stressful bicycling conditions. They also noted their general comfort with, and preference for, bikeways separated from adjacent vehicular traffic.

Other barriers to bicycling include the climate in the San Antonio District, particularly in the summer months, which can prohibit extended outdoor activity due to the heat or make bicycling dangerous. Bicycling activity increases in the cooler evening hours, resulting in a greater need for lighting on trails and bicycle lanes. This is especially pertinent in areas where shoulder bicycle lanes on rural highways are the main or only bicycle network.

Stakeholder input and existing plans note that there is momentum and desire for expanding bikeways in the district, including commuting infrastructure such as bikeways and paths, within smaller towns and communities. Several plans across the region have outlined new active modes infrastructure in the coming decades. It is also noted that the lack of compliant pedestrian infrastructure would mean potential bicycle projects would serve more populations than just bicyclists.

Figure 2. Bicycle Lane on Wurzbach Parkway near McAllister Park



Recommendations

Priority Segments

A prioritized set of roadway segments indicates where bikeway improvements are most needed in the district, as determined through a set of goal factors related to safety, connectivity, community input, and other indicators. For the San Antonio District, the high-priority segments are generally found in roadways that are central main streets within cities and towns or are major connectors between destinations. Improvements on or along high-priority central main street corridors may address critical needs related to bicycling safety and expand the destinations residents and visitors are able to reach by bicycle.

Bikeway Network Functions

Similarly, the bikeway functions identified through the San Antonio District Bicycle Plan provide guidance on how residents and visitors are likely to use bikeways in various SHS roadways. Central roadways within and around cities and towns are predominately identified as “all-ages bikeways,” as they are likely to be used by both more and less confident riders to reach local destinations such as recreation centers and schools. In some areas near city centers but not adjacent to schools and community centers, “daily-travel bikeways” are identified. These meet the needs of riders who rely on contiguous routes for bicycle trips to reach daily destinations like places of employment and local shops. For most of the San Antonio District, “basic bikeways” are identified on the rural highways that connect the district’s towns.

Bicycle Tourism Trails Network

“Long-distance bikeways” are those along the TxDOT Bicycle Tourism Trails (BTT) Network, a series of recreational and tourism-focused bicycling routes that connect to regional destinations with consistent stop opportunities at small towns and other travel resources.

This plan also identifies refinements to the original 2018 Example Network BTT, expanding to additional destinations east, west, and south, as well as proposing safer and more comfortable alignments. The proposed new and altered routes utilize river greenways and trails to connect to additional municipalities, including Seguin, Pleasanton, Bandera, and Utopia.

Implementation and Next Steps

By pursuing a range of implementation strategies in cooperation with local and regional partners, the San Antonio District can work to add bikeway improvements through a variety of roadway project types. Bikeway projects developed by TxDOT may be structured and delivered as a standalone project, as an improvement within a larger roadway project, and as lower-cost projects such as quick-build, maintenance, or pilot projects. In other project types, bikeway improvements will ultimately be delivered through partnerships with local governments, especially for key connections of local importance. These will include roadway improvements led by local county or city sponsors as well as improvements required by private development that impact TxDOT roadways and facilities.

As bikeways are implemented throughout the San Antonio District, needs and conditions for the region’s bicyclists will evolve. Continued engagement with local agencies and stakeholders will be key to maintaining progress on the plan’s goals of creating a safer and more comfortable transportation network for all users.



Figure 3. Wurzbach Parkway near Perrin Beitel

ONE

Introduction



Purpose and Priorities



The San Antonio District Bicycle Plan charts a vision for how state highways can contribute to the bicycling networks of Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson. The State of Texas' on-system transportation network—roads owned, operated, and maintained by the Texas Department of Transportation (TxDOT)—connects communities, regions, and destinations within and outside of Texas. While many bikeways are planned and funded at the local level, incorporating bikeways on the Texas highway system strengthens regional bicycling connections. Bicycle connections on the Texas highway system give people a non-driving option to reach and traverse urban and rural destinations. Developing a framework for on-system bikeway investments is vital as the state works to provide safe, thoughtfully designed, well-maintained facilities for bicyclists both within TxDOT districts and across the state.

This plan is one of four pilot District Bicycle Plans that TxDOT is preparing in support of Connecting Texas 2050, the state's long-range transportation plan. The four pilot plans cover the Bryan, Pharr, Laredo, and San Antonio districts, with the intention to complete similar bicycle plans for all 25 TxDOT districts. The District Bicycle Plans analyze needs on the highway system, prioritize routes, and identify potential solution types. This effort includes technical studies, stakeholder engagement, and virtual public meetings.

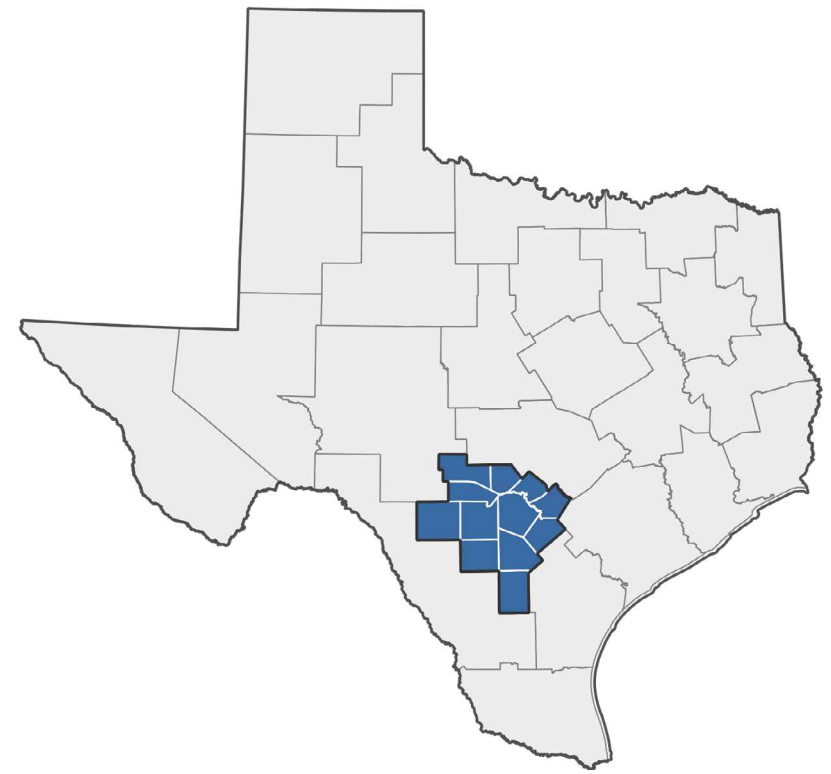


Figure 4. The San Antonio District within the state of Texas

TxDOT's Role in Bicycle and Pedestrian Planning

Connecting Texas 2050 is creating a vision for bicycle and pedestrian transportation across the state. TxDOT's role in active transportation includes developing bikeway design guidance, constructing appropriate bicycle accommodation along the State Highway System (SHS), providing local active transportation project support, and broadly supporting programs and initiatives that enhance safety for people who walk and bicycle. Major programs and activities performed by TxDOT that are related to bicycle and pedestrian planning include:

- Allocating state and federal funding for local projects and programs.
- Requiring engineers to consider bicycling and walking in construction and reconstruction projects.
- Providing engineering standards and design guidance for pedestrian and bicycle facilities.
- Promoting safe bicycle and pedestrian behavior and multimodal connections.
- Integrating bicycle and pedestrian needs into the TxDOT planning processes.

Together, these TxDOT bicycle and pedestrian activities span planning, engineering, and construction activities to expand regional transportation options across the state.

TxDOT is committed to routinely providing bikeways when planning and designing transportation facilities, addressing the needs of the target design user.

What is a District Bicycle Plan?



The San Antonio District Bicycle Plan documents and evaluates bicycling needs on and across the on-system highway network, identifying locations where better bikeways would enhance mobility, connectivity, safety, and tourism. It will guide the San Antonio District in future project development and investment decisions by highlighting places where bicycling needs or potential benefits are the greatest. The plan uses information about the district's communities—such as demographics, land use, and destinations—to understand what kinds of travelers and bicycle trips different routes may support, informing design decisions. The ultimate purpose of this plan is to reduce barriers to bicycling in the region and support the growth of healthy, sustainable, connected, and accessible communities by increasing transportation options and supporting economic development.

The plan draws its policy framework from Connecting Texas 2050 and the Texas 2023 to 2027 Strategic Plan and aims to advance the following goals:

Promote Safety – Champion a culture of safety that reduces crashes and fatalities through the five “E’s” of Evaluation, Engineering, Encouragement, Education, and Enforcement.

Deliver the Right Projects – Ensure efficient use of state resources by implementing effective planning processes to help deliver the right projects on time and on budget.

Focus on the Customer – Ensure the public and stakeholders can see and understand TxDOT’s decisions and provide feedback that is heard.

Foster Stewardship – Integrate environmental considerations into all TxDOT activities so that future generations of Texans can benefit from the state’s valuable natural, historic, and cultural resources.

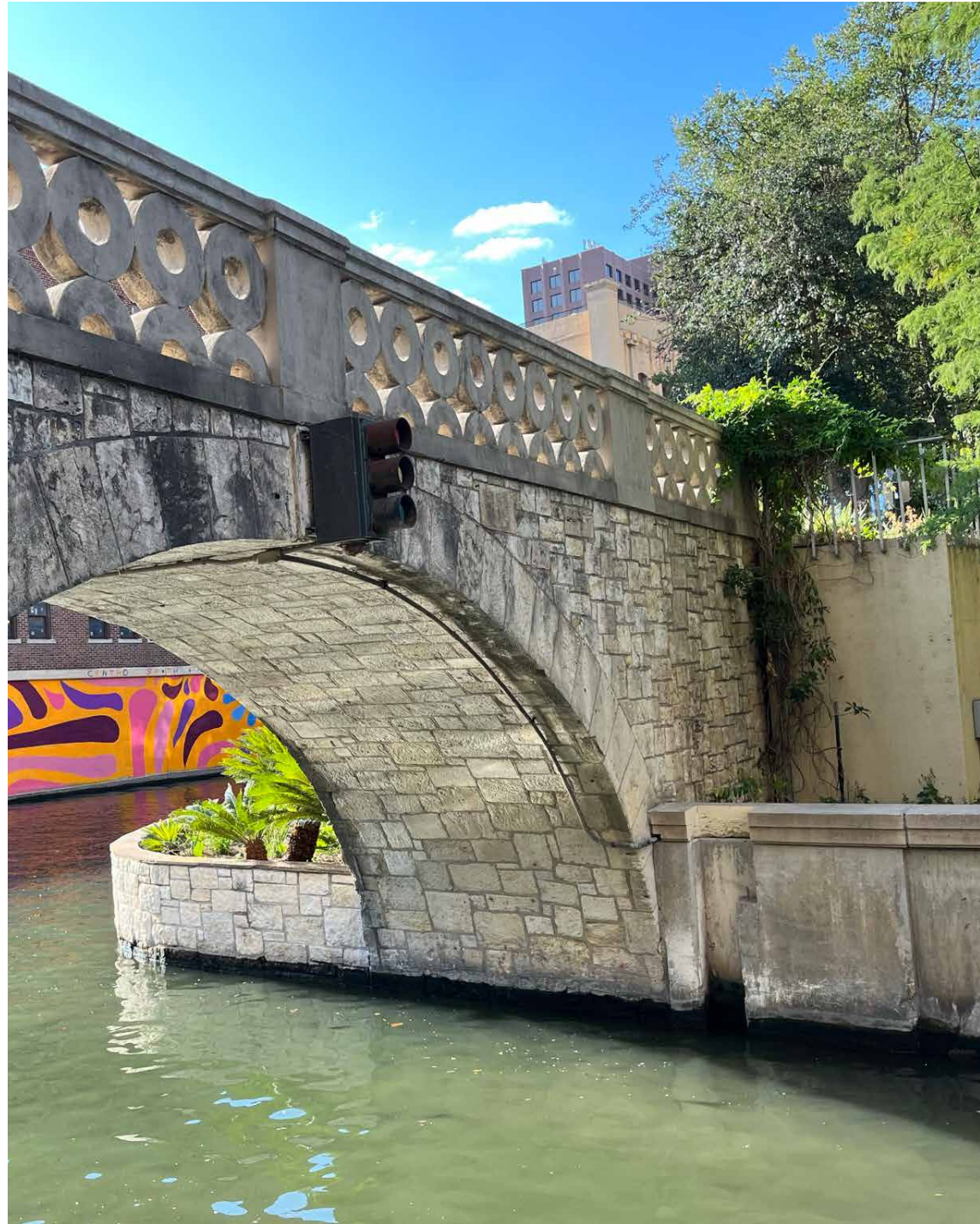
Optimize System Performance – Develop and operate an integrated transportation system that provides reliable and accessible mobility enabling economic growth.

Preserve Our Assets – Deliver cost-efficient preventive maintenance for the transportation system that keeps Texas roads, bridges, and other infrastructure and technology in good repair.

Products and Outcomes

The San Antonio District Bicycle Plan contents include multiple resources that will guide bikeway project development for the San Antonio District. It is important to note that the plan can benefit local communities, as cities and counties can coordinate with TxDOT on projects along on-system highways that pass through their jurisdictions. The six essential outputs of the TxDOT District Bicycle Plans are identified in Figure 5.

District staff will use the plan outputs to develop projects, select context-sensitive bikeway designs, and broadly make decisions of where, when, and what types of bikeways should be implemented at any given intersection or along any given corridor.



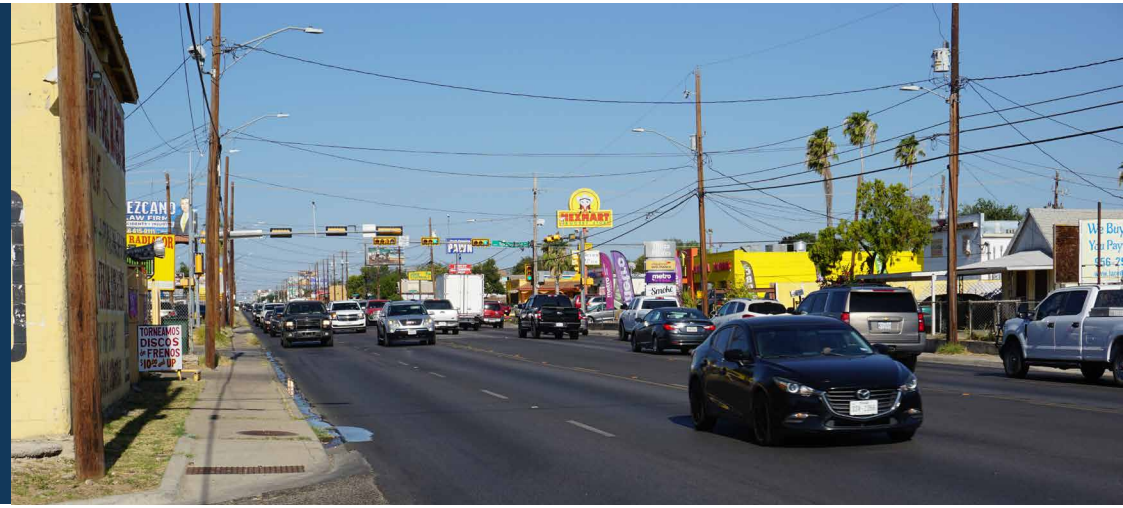


Components

Component	What Question Does It Answer?	Definition
Existing Conditions	<i>What does it feel like to bicycle on highways in the district today?</i>	TxDOT and partner data provides a snapshot of on-system conditions at the time this plan was developed, such as existing bikeways, shoulder width, speed limits, crashes and more.
Bikeway Needs Assessment	<i>What makes bicycling at this location feel uncomfortable or stressful?</i>	This analysis uses existing conditions data to identify road segments and crossings where gaps and deficiencies affect people traveling by bicycle. It also incorporates on-the-ground knowledge from TxDOT staff, agency partners, and local plans as locally-identified needs.
Bikeway Development Priorities	<i>How should a project advance to meet these bicycling needs?</i>	This analysis provides TxDOT Districts with guidance regarding how and when to develop bicycling improvements. Bikeway development categories are applied based on a series of prioritization criteria.
Bikeway Functions	<i>Who will use this bikeway, and for what kinds of trips?</i>	These segment-level designations indicate the likely type of bicyclist trip and potential users along an on-system highway, such as children or long-distance riders. The bikeway function is intended to inform decisions about where to provide a bikeway and what design is most suitable.
Refined Bicycle Tourism Trails Routes	<i>Where will the district plan for long-distance biking routes?</i>	The Plan includes refinements to the 2018 Bicycle Tourism Trails Example Network based on the results of the Bikeway Needs Assessment and other analyses conducted as part of the District Bicycle Plan development process.
Bikeway Design User Guide	<i>How should bikeways be designed to suit the local context and needs?</i>	This document complements the TxDOT Road Design Manual, which contains bikeway design guidance, by assisting roadway designers in the selection of appropriate bikeway facilities based on the surrounding context and bikeway function.

Figure 5. TxDOT District Bicycle Plan Products

Plan Timeline and Methodology



The San Antonio District Bicycle Plan kicked off in August 2022 and was developed in four distinct phases over a period of a year and a half: Existing Conditions, Needs Assessment, Prioritization, and Plan Development. All four pilot districts worked concurrently on this timeline with the goal of sharing best practices across districts. The district plans were also developed in coordination with the Statewide Long-Range Transportation Plan and used common data sources and planning goals, though the district plans followed an independent schedule.

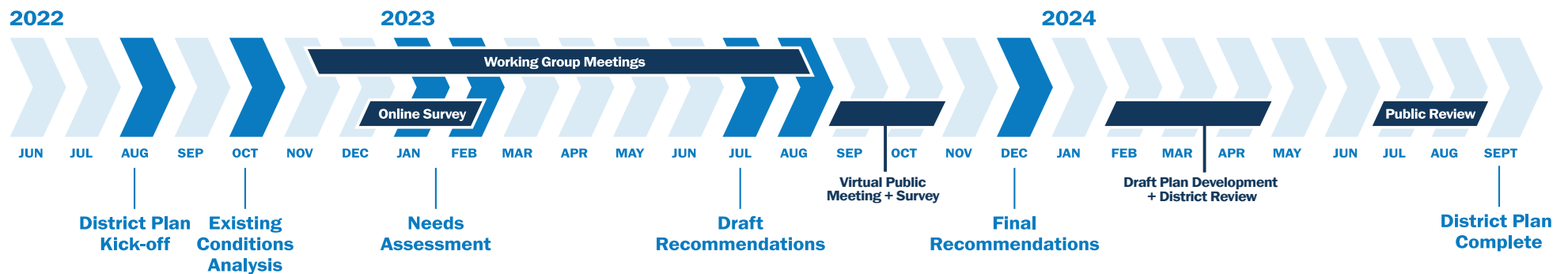


Figure 6. San Antonio District Bicycle Plan Timeline

Benefits of Bicycling

Research indicates that strategic investments in active transportation infrastructure benefit local businesses, community public health outcomes, and environmental quality. In particular, investing in bikeways and increasing rates of bicycling can encourage physical activity, reduce risk of chronic disease and healthcare costs, and improve health outcomes.

Economic Benefits

Increases in bicycling rates for everyday and recreational purposes yield economic benefits for local communities through increases in local retail sales, bicycle repair services, and hospitality services associated with tourism.¹ Recreational riders may spend between \$78 and \$275 locally per day during riding trips, for an average of \$136 as identified through a literature survey in the 2018 Bicycle Tourism Trails (BTT) Study.² Non-recreational riding boosts sales as well—a study of 14 bicycle projects across 6 cities found that when new bicycle lanes were added to commercial corridors, retail and food service businesses either saw an increase in sales revenue and employment or no impact, with food service seeing the most consistent increase.³ As new shared-use path infrastructure is added, many communities see modest increases in their property values; for example, a study of home prices in Bexar County found homes near trails valued at 2% more than homes farther from trails.⁴

1 “An Economic Impact Study of Bicycling in Arizona: Out-of-State Bicycle Tourists and Exports.” Arizona Department of Transportation. June 2013, https://apps.azdot.gov/files/ADOTLibrary/Multimodal_Planning_Division/Bicycle-Pedestrian/Economic_Impact_Study_of_Bicycling-Final_Report-1306.pdf.

2 “Bicycling Tourism Trail Study Technical Memorandum 1: Benefits of Bikeways and Trails,” Texas Department of Transportation, 2018, <https://ftp.dot.state.tx.us/pub/txdot-info/ptn/tech-memo-1-bikeway-trail-benefits.pdf>

3 Liu, Jenny and Jennifer Dill. “Understanding Economic and Business Impacts of Street Improvements for Bicycle and Pedestrian Mobility – A Multi-City Multi-Approach Exploration.” National Institute for Transportation and Communities, June 2019, <https://nrtc.trec.pdx.edu/research/project/1031/>.

4 Asabere, P.K. and F.E. Huffman. “The Relative Impacts of Trails and Greenbelts on Home Prices.” The Journal of Real Estate Finance and Economics, Vol.38, No. 4, pp 408-419.

Public Health Benefits

Increases in bicycling brought by comfortable, accessible bicycling infrastructure yield a wide array of health benefits on a personal and community level. Regular active transportation lowers rates of obesity, high blood pressure, and insulin levels.⁵ Regular bicycling exercise can be especially beneficial to upper and lower body strength, endurance, and cholesterol in older adults.⁶ For mental health concerns, research has shown that frequent bicycle trips (at least three per week) may aid in improving mental wellbeing.⁷ A study of bicycle commuters also found reduced rates of overall stress.⁸ These benefits can add up; for every dollar spent on a shared-use path, communities can save nearly three dollars in reduced healthcare costs from improved overall health and fitness.⁹

5 Gordon-Larsen, Penny et al. “Active commuting and cardiovascular disease risk: the CARDIA study.” Archives of internal medicine vol. 169,13 (2009): 1216-23. <https://pubmed.ncbi.nlm.nih.gov/19597071/>.
6 Verney, Julien, et al. “Combined lower body endurance and upper body resistance training improves performance and health parameters in healthy active elderly.” European Journal of Applied Physiology 97.3 (2006): 288-297.

7 Liang Ma, Runing Ye, Hongyu Wang, “Exploring the causal effects of bicycling for transportation on mental health,” Transportation Research Part D: Transport and Environment, Volume 93, 2021, <https://doi.org/10.1016/j.trd.2021.102773>.

8 Avila-Palencia I, de Nazelle A, Cole-Hunter T, et al. The relationship between bicycle commuting and perceived stress: a cross-sectional study BMJ Open (2017): 7:e013542. doi: 10.1136/bmjopen-2016-013542.

9 Guijing, Wang, Caroline A. Macera, Barbara Scudder-Soucie, Tom Schmid, Michael Pratt, David Buchner, and Gregory Heath, Cost Analysis of the Built Environment: The Case of Bike and Pedestrian Trails in Lincoln, Neb. American Journal of Public Health 94, (2004): 549-553, <https://doi.org/10.2105/AJPH.94.4.549>.

Enhanced Safety for All Users

Different bicycle lane treatment types yield a variety of safety improvements depending on street context. New bicycling facilities have been found to lead to up to a 65% reduction in crash frequencies.¹⁰ Those safety benefits extend to street safety for other modes, not just bicycling. Research analyzing bicycling rates, safety, and infrastructure prevalence in 12 major U.S. cities found that separated bicycle lanes were associated with improved safety for road users of all modes, possibly owing to traffic-calming effects and reduced speeds.¹¹

Reductions to crash frequencies through safety improvements also yield benefits through associated societal costs. By comparing the changes in crash frequency to the cost of a hypothetical project involving installation and maintenance of a bicycle lane, researchers found that the expected economic benefit yielded from the reduction in crash frequency was twice the cost to install and maintain the bicycle lane over a 3-year period.¹²

Improved Air Quality

Changes in transportation choices made possible through new and expanded bicycling facilities can yield local and regional environmental benefits, specifically to emissions and air quality. Public health studies have found that the reduction of harmful particulate emissions and ozone associated with shifting vehicle trips to bicycle trips would save lives and reduce healthcare needs and costs.¹³ These outcomes would benefit residents both within cities and regionally.

10 Dadashova, Bahar, Karen Dixon, Joan Hudson, et al.

11 Wesley E. Marshall, Nicholas N. Ferencak, "Why cities with high bicycling rates are safer for all road users," *Journal of Transport & Health*, Volume 13, (2019): 100539, ISSN 2214-1405, <https://doi.org/10.1016/j.jth.2019.03.00>.

12 Dadashova, Bahar, Karen Dixon, Joan Hudson, et al. "Addressing Bicyclist Safety Through the Development of Crash Modification Factors for Bikeways." Texas A&M Transportation Institute, September 2022, <https://trid.trb.org/view/2023867>.

13 Grabow, Maggie L et al. "Air quality and exercise-related health benefits from reduced car travel in the midwestern United States." *Environmental health perspectives* vol. 120,1, 2012, <https://pubmed.ncbi.nlm.nih.gov/22049372/>.

Increased Transportation Options

The addition of bicycling infrastructure expands bicycling as an option for many people. This is especially true for the more than half of U.S. adults who consider themselves "interested but concerned" about bicycling and who require lower stress facilities to ride a bicycle. One study of several major cities surveyed residents who self-identified as "interested but concerned" bicyclists in areas with new protected bicycle lanes. Forty-three percent of these riders surveyed reported that because of a new facility near them, they found themselves riding more often overall.¹⁴ Further, bicycle facilities can expand access to transit service, doubling the accessible distance to stations and complementing transit trips as a first/last-mile mode option.¹⁵

The option to travel by bicycle presents a more affordable transportation mode when compared to the costs of vehicle ownership, which on average total \$9,561 per year.¹⁶ By contrast, the average annual cost of owning and riding a bicycle is \$308.¹⁷

14 Monsere, Christopher, Jennifer Dill, Nathan McNeil, Kelly J. Clifton, Nick Foster, Tara Goddard, Mathew Berkow, Joe Gilpin, Kim Voros, Drusilla van Hengel, and Jamie Parks. *Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the U.S.* NITC-RR-583. Portland, OR: Transportation Research and Education Center, 2014, <http://dx.doi.org/10.15760/trec.115>.

15 Krizek, Kevin J., Eric Stonebraker, and Seth Tribbey. "Bicycling Access and Egress to Transit: Informing the Possibilities." *Mineta Transportation Institute*, April 2011, https://transweb.sjsu.edu/sites/default/files/2825_bicycling_access.pdf.

16 "Your Driving Costs Fact Sheet – December 2020." American Automotive Association, 2020. <https://newsroom.aaa.com/asset/your-driving-costs-fact-sheet-december-2020/>.

17 "The New Majority: Pedaling Towards Equity." League of American Bicyclists, http://bikeleague.org/sites/default/files/equity_report.pdf.

TWO

Community and Stakeholder Outreach



The people who live and work in the San Antonio District have on-the-ground experience with, and knowledge about, conditions across the district's communities. They understand the challenges and opportunities that TxDOT will encounter as it works to improve conditions for bicyclists. The San Antonio District Bicycle Plan was informed by a combination of stakeholder meetings, which brought together representatives with that local knowledge, and interactive mapping surveys that reached the general public. Two working groups were convened to provide invaluable input on overall plan progress, especially the components focused on analysis of local conditions and prioritization. The following section describes how each of the stakeholder groups and surveys came together to support the San Antonio District Bicycle Plan process and outcomes.

Technical Working Group

The Technical Working Group (TWG) was comprised of local and regional experts who have a close understanding of the processes and technical conditions that inform bicycle planning in their areas. This includes staff of the Alamo Area Metropolitan Planning Organization (AAMPO), the Alamo Area Council of Governments, VIA Metropolitan Transit, relevant TxDOT district staff, staff of local cities and counties, and institutions whose work centers on project development, safety, and active transportation. TWG members were asked about local conditions, their experiences planning and implementing projects, relevant datasets, and how to align bicycle plan priorities with local goals. A full list of TWG members is included in the Acknowledgements.

This group met three times during the plan development. Key themes identified by the San Antonio District TWG include:

- There is a need for enhanced coordination between local plans, such as the City of San Antonio's Bicycle Network Plan and TxDOT planning efforts, to ensure a seamless and well-connected network, both on and off the SHS.
- There is increasing recognition of the diverse needs of different user groups, including sport bicyclists and utilitarian riders. Discussions highlighted the distinct experiences bicyclists face in rural and urban settings. Policymakers and planners are increasingly adopting an inclusive approach and incorporating qualitative data and personal experiences from the bicycling community in plans and projects.
- Users prefer separated or off-street facilities rather than traditional painted bicycle lanes. Small improvements, such as green intersection markings, were found to significantly enhance user comfort. TWG members noted the growing prevalence of electronic assist bicycles (ebicycles), prompting considerations for their impact on travel distance, speed, and facility needs.
- There was broad-based support for educational campaigns to raise awareness about road rules for bicyclists and non-bicyclists, contributing to improved safety.
- Discussions highlighted the importance of system maintenance, signals for bicycles at intersections, and overcoming bureaucratic challenges related to infrastructure projects.
- The group identified challenges in accessing funding sources, such as Safe Routes to School, as barriers to closing key gaps and making critical connections in the bicycle network.



Community Needs Working Group

The Community Needs Working Group (CNWG) was comprised of local and regional stakeholders from community-based organizations, educational institutions, and other agencies and organizations. While most of the invitees do not focus their work on transportation, their direct work with local communities gives them insight into the daily needs of the people they serve. They also offered the project team local perspectives on access to opportunity, safety, environmental justice, public health, and related topics.

Through the CNWG, stakeholders shared early insights into the barriers, needs, and opportunities related to bicycling in their communities. The CNWG worked with the project team to determine what publicly available data could be used to locate communities who have limited transportation resources, experience increased burdens from existing roads and traffic, or experience elevated rates of health conditions that can be improved through access to physical activity. A full list of CNWG members is included in the Acknowledgements.

This group met once during the plan development. Key themes identified by the San Antonio District CNWG included:

- The bicycle network is not only used by bicyclists and needs to recognize potential conflicts between user groups, such as transit riders and pedestrians. Where sidewalks are incomplete, bicycle lanes and facilities become the “de facto small vehicle lane” for people in wheelchairs, with carts, or those rolling in any way. Facilities that minimally serve at-speed, upright two-wheel bicycles do not safely serve adaptive cycling devices or other slower-speed riders.
- Inadequate pavement and bicycle lane maintenance is a barrier to using on-street bikeways, leading many travelers to bicycle on sidewalks or in the roadway.
- Conflict points at bus stops and pedestrian crossings are not modally separated and therefore, are not safe. Additionally, many of these spaces do not have safe zones or accommodations for visually impaired people or travelers with other Americans with Disabilities Act needs, and more inclusive design guidance is needed.
- Major on-system roads serve as crucial components of the bicycle network due to the number of resources along these corridors and the connections they provide between destinations. At the same time, on-system highways can act as network barriers due to high vehicle speeds.
- Travelers prefer bikeways, such as the Mission Reach near the Stinson-Mission Municipal Airport, which are separated from vehicular traffic via landscaping, provide wide right-of-way (ROW) with separation between bicyclists and pedestrians, and have clear and abundant signage. CNWG participants prefer a longer route on protected paths than a more direct route alongside high-speed heavy vehicular traffic.
- The typical design of major corridors, with narrow bicycle lanes and minimal buffers separating bicyclists from general-purpose travel lanes, are challenging for most bicyclists. Poor-quality bicycle facilities endanger users when they must merge with traffic to avoid roadblocks, often in conflict with high-speed vehicular drivers who are unwilling to share the roadway.
- Despite design challenges, there is an existing culture of on-street bicycling in San Antonio, and users appreciate wider shoulders that give additional buffer space from vehicle traffic.

Public Input

Online Web Map Surveys

In 2022 and 2023, two interactive map surveys were employed to solicit input from working group members and members of the general public at critical points in the plan's development timeline. In addition to direct outreach to bicycling advocacy groups, the study team encouraged participation through phone calls and emails.

- Bicycling Conditions Map:** The first map survey, shown in Figure 7, was open from December 2022 to February 2023 to collect input on where people bicycle today or wish to see improvements. This includes locations of bicycling destinations, desired routes, and key safety concerns. This map was part of a survey with questions related to general transportation behavior and desired bicycling facility types. Key findings are shown below.
- Bicycling Recommendations Map:** Figure 8 shows comments collected in the second interactive map survey, which gathered input on the draft priority network, BTTs, and network functions from September to October 2023. Stakeholders reviewed recommendations for supporting bicycling on the SHS, providing comments on how those recommendations could be better shaped to address existing needs and opportunities in the San Antonio District.

Survey Results Summary

- Conditions Map Survey responses:** 1,642 responses, making 803 comments
- Recommendations Map Survey responses:** 386 responses, 174 written comments



SAN ANTONIO DISTRICT: Heatmap of Survey Comments for Bicycling Conditions

Survey Comments



County Boundary

District Boundary

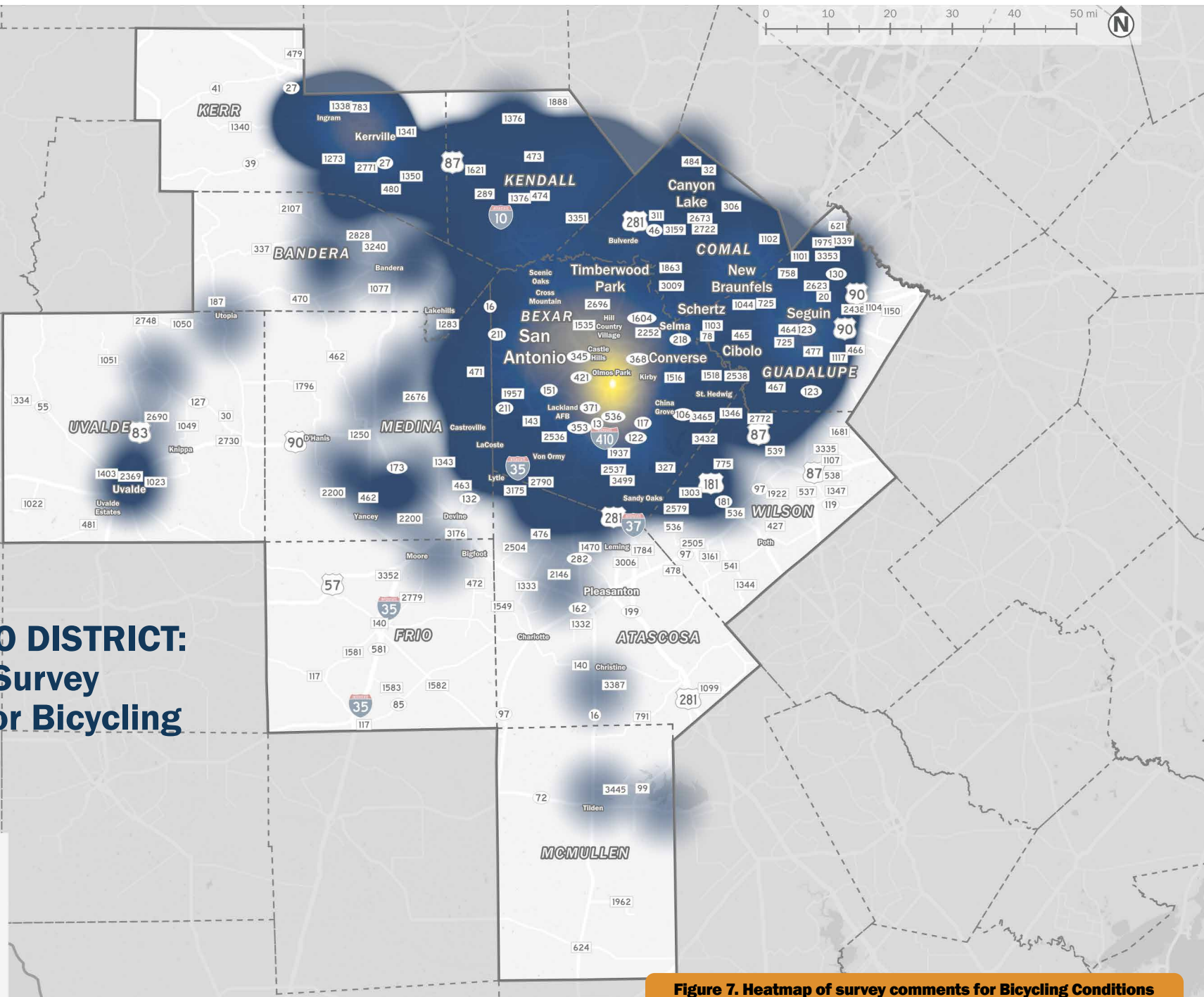
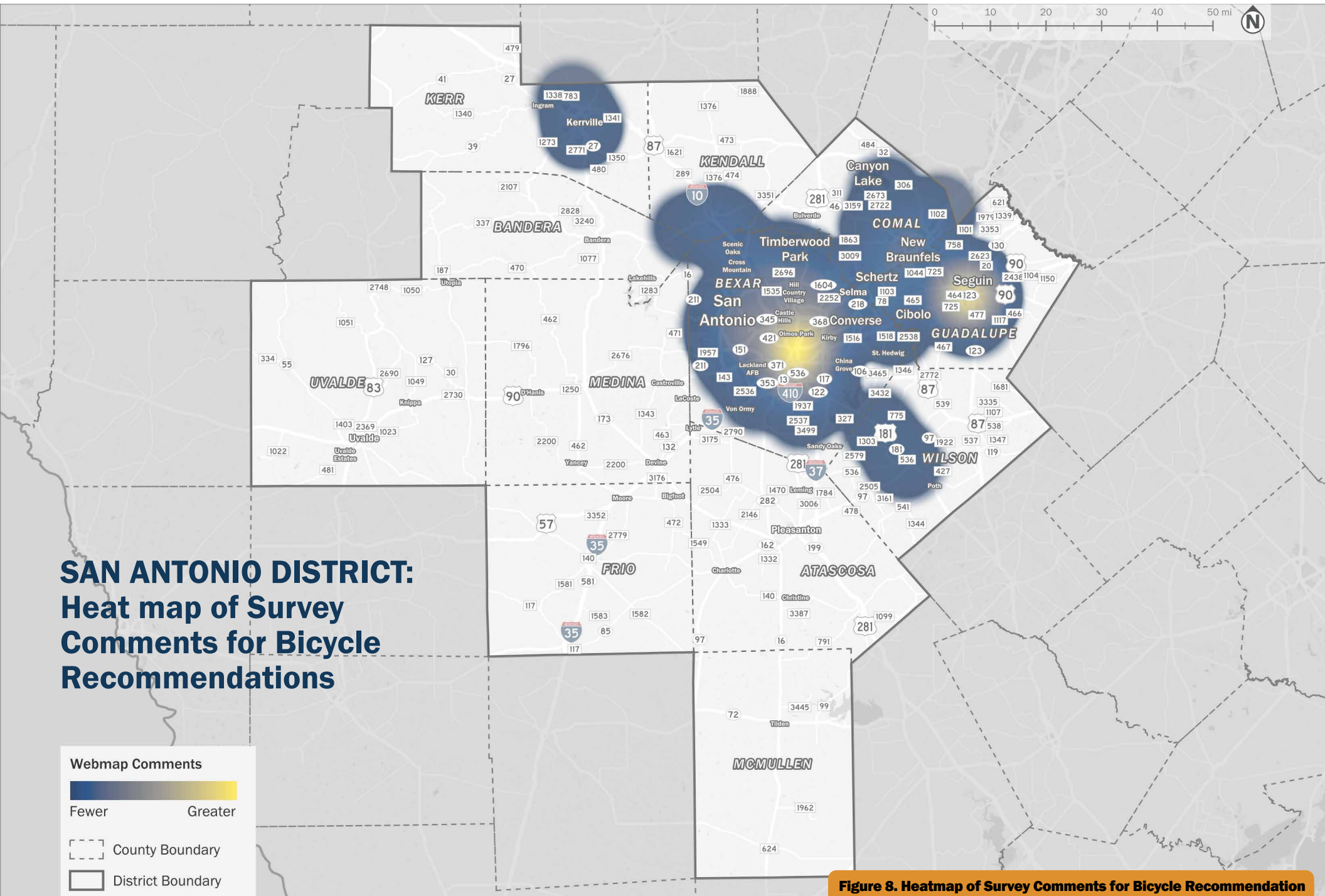


Figure 7. Heatmap of survey comments for Bicycling Conditions



Key Findings

Conditions Map Survey

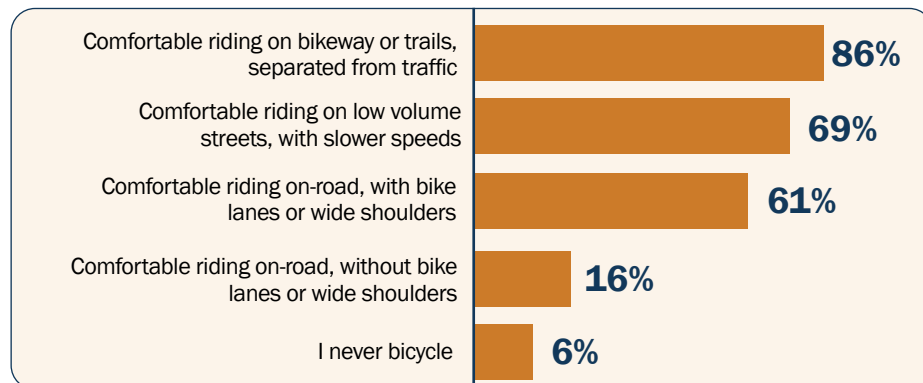
- While most respondents (80%) drive as their primary mode to get around, 18% use a bicycle as their primary mode of transportation. The remaining 2% are split between riding the bus, walking, or using a mobility device. This rate is less than the statewide average of car commuters (87%²⁰).
- About three-fourths of respondents (74%) own both a personal vehicle and a bicycle. Only 8% have access to a bicycle and no other mode of transportation (including rideshare bicycles).
- Most trips in a typical week of any mode of transportation are for work or to run errands (approximately 68% and 67%, respectively).
- By comparison, trips by bicycle are most often for exercise, to enjoy time outside, and as a shared activity with friends or family. Fewer than half of respondents (38%) bicycle specifically to a destination, and less than a quarter (23%) bicycle to save money.
- Most respondents (65%) bicycle at least once a week (including 26% of respondents who bicycle daily), and 40% of respondents report that they are bicycling more frequently since COVID-19 (10% are bicycling less frequently).
- A large majority (86%) of respondents are comfortable riding on bikeways or trails separated from traffic. More than two-thirds (69%) are comfortable riding on low-volume streets with low speeds. Most (61%) are comfortable riding on roads with bicycle lanes or wide shoulders, but only 16% respondents are comfortable on roads without bicycle lanes or wide shoulders (Figure 9).

²⁰ "American Community Survey," U.S. Census Bureau, 2021, data.census.gov.



Recommendations Map Survey

- More than 60% of submitted comments agreed with the draft bikeway functions and BTT designations.
- Less than 12% of survey respondents agreed with the initial draft of route prioritization presented before refinement. (The priority routes were recalculated to include new data on planned bikeways and transit after the survey closed.)
- Respondents commenting on plan recommendations highlighted the importance of integrating with public transit, and specifically connecting bicycle facilities to transit centers, University Park and Ride, Leon Creek Greenway, and other hubs.
- The dangerous conditions of certain road segments are a concern for many respondents, who emphasized the need for separated and protected bicycle facilities. Issues included high-speed traffic, lack of bicycle lanes, and dangerous intersections.
- Specific requests were made for facilities on select roadways, including protected bicycle lanes on Blanco Road and Elliott Knox Boulevard. Specific comments included for prioritization included Broadway and Veterans Memorial Highway (FM 534) in Kerrville to have the highest priority.



% = number of people

Figure 9. San Antonio District Level of Comfort Results

Source: Bicycle Conditions Map, 2023 Online Survey

Virtual Public Meeting

TxDOT uses virtual public meetings to publicize planning projects and ask for input. These meetings are delivered in the form of a pre-recorded presentation that is made available online for a set period of time. The TxDOT District Bicycle Plans virtual public meeting, which was made available in fall 2023, provided an overview of the plans' purpose and products and invited attendees to respond to the second online mapping survey. The meeting had three goals:

1. Invite the public to learn about the planning process
2. Ask the public about their vision for the future of bicycling in Texas
3. Invite the public to provide input and comments on proposed recommendations

Input and comments collected during the virtual public meeting are reflected above via survey responses.



Figure 10. Virtual Public Meeting Announcement

THREE

Existing Conditions



District Profile

The San Antonio District spans 12 counties in south central Texas—Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson—which are a mix of urban and rural areas. As of 2023, 2.6 million people reside across 60 incorporated cities and 27 unincorporated places in the district.¹⁸ The region's spoke-and-wheel highway system was designed to connect these places to central San Antonio as well as to each other. Of the district's 2.6 million population, the majority live in the City of San Antonio (1.4 million residents), which is partially in Bexar County (2,009,324), Comal County (161,501), and Medina County (50,748).¹⁹

San Antonio's transit provider, VIA, serves the region and provides opportunities for bicyclists to connect to more-distant destinations and for bicycle commuters to rely on an alternate mode in case of inclement weather. The numerous greenways across the district, as well as the hilly/rolling terrain recreational terrain in the north, serve leisure and sport bicyclists.

These district cities and towns are connected by 4,314 miles of SHS roadways. Across that network, about 9%, or 399 miles, are limited-access highways where bicycling is prohibited. Due to San Antonio's size and significance to nation-wide commerce, there are many interstates in the district that limit access and prohibit bicycles. The remaining 3,915 miles are mostly rural, at-grade highways; at-grade roadways that function as thoroughfares in cities and towns; or highways with accompanying frontage roads.

Along many highways where bicycling is permitted, according to local advocates, bicyclists, and CNWG members, freight and large trucks travel at high speeds and can make the journey for bicyclists uncomfortable and dangerous. Due to the mix of agricultural and industrial land uses, as well as the fact that San Antonio is a major economic hub, the district's state highways carry significant volumes of these large and heavy vehicles into, out of, and through the region. Congestion caused by freight trucks is a major consideration for prioritization and design of future highway system upgrades and expansions.

¹⁸“San Antonio District – District Profile,” Texas Department of Transportation, <https://www.txdot.gov/content/dam/docs/district/san-antonio-district-profile.pdf>.

¹⁹“Census Factfinder,” U.S. Census Bureau, 2020, data.census.gov.



SAN ANTONIO DISTRICT: State Highway System

- Bicycling Allowed
- Access Controlled
- County Boundary
- District Boundary

U.S. Mercator

Figure 11. State Highway System, San Antonio District

Community Needs

Residents and visitors in the San Antonio District are likely to benefit from expanded transportation options, including improved public health outcomes and increased business and economic vitality associated with improved bicycling facilities, as the district population grows. As shown in Figure 13, the district's residents are slightly more likely than the average Texan to live with a disability or in a car-free household. Expanded bikeways would allow many residents greater access to jobs, transit, day-to-day needs (e.g., grocery stores) and other community resources. In other areas, community needs statistics across the San Antonio District are equal or close to overall statewide averages, including the number of households that are cost-burdened by their housing situations, the populations with heart disease and asthma, and the rate of fatal and severe crashes per capita. These similarities position San Antonio as an excellent representative pilot district for the continued statewide bicycle plan. The needs categories in Figure 13 relate to bicycling access benefits by describing populations that cannot legally drive, may not have access to a vehicle, or who would benefit from cleaner air and more spaces dedicated to people-powered activity.

Bicycling Conditions in San Antonio: Bikeway Network on the State Highway System

As noted in Figure 14, of the 3,915 miles of roadway where bicycles are permitted to travel, relatively few designated bikeways exist on TxDOT roadways in the San Antonio District. The most common bikeway type is bicycle-accessible shoulders along rural roadways (1,258 miles, or nearly 32% of roadways), where users may ride in the wider outer area adjacent to the travel lane. There are approximately 44 miles (about 1%) of striped bicycle lanes and separated bicycle lanes in the district, nearly all of which are located within SL 1604 as shown in Figure 16, including several miles in Kerrville and the City of New Braunfels. Within the City of San Antonio, the bicycle lanes are distributed slightly more in the north with long portions along Wurzebach Parkway and Blanco Road.



Figure 12. A person rides along U.S. Highway 181



Community Profile

SAN ANTONIO DISTRICT

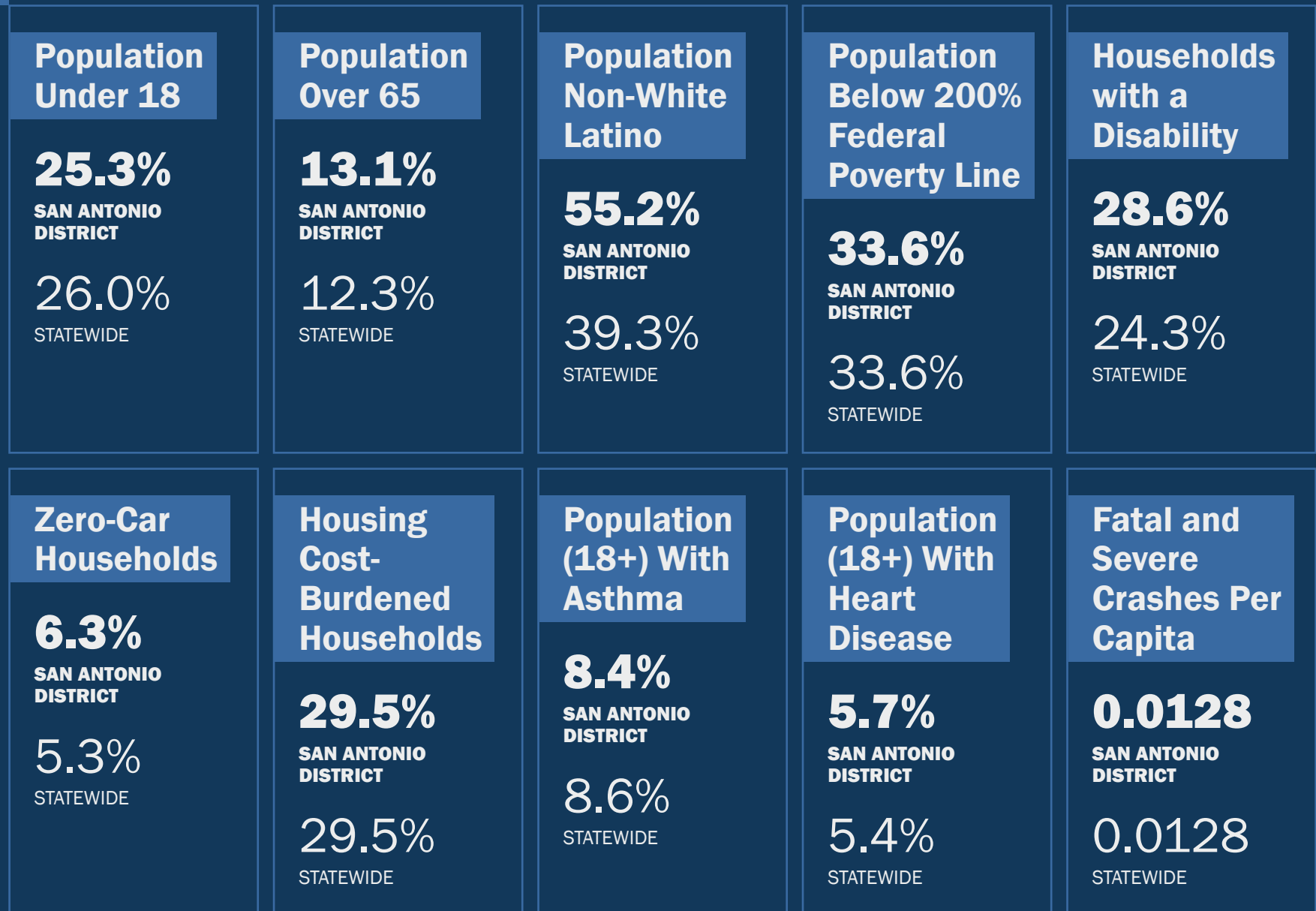


Figure 13. Community Needs in San Antonio District

Bikeway Facility Types

SAN ANTONIO DISTRICT

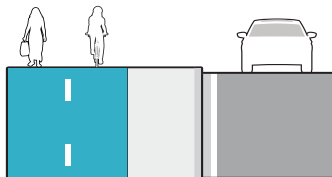
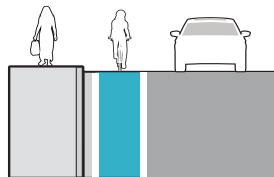
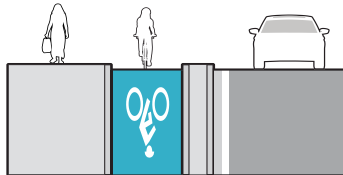
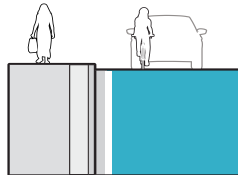
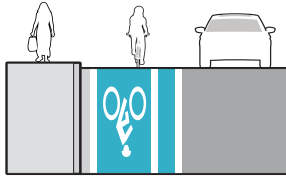
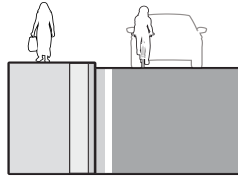
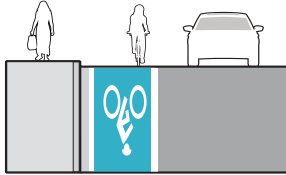
Facility Type	Miles		Facility Type	Miles	
Shared Use Path	1.6		Bike-Accessible Shoulder	1,258.2	
Separated Bike Lane	0.2		Shared Lane	9.9	
Buffered Bike Lane	1.1		None	2,600.2	
Bike Lane	44.3		NOTE: The bikeway types shown are general in nature and provided as examples. Actual field conditions may vary.		
Total District Miles: 3,915.5					

Figure 14. San Antonio District Bikeway Types by Facility Type

SAN ANTONIO DISTRICT: Existing Bikeway Types

Facility Type

- Bicycle Lane
- Buffered Bicycle Lane
- Bikeable Shoulder
- Separated Bicycle Lane
- Shared Lane
- Shared Use Path
- Access Controlled
- County Boundary
- District Boundary

NOTE: Graphic displays existing bikeway types for the State Highway System (SHS).

Figure 15. Existing Bikeway Types in the San Antonio District

SAN ANTONIO DISTRICT: Existing Local Facilities

Facility Type

- Bicycle Lane
- Buffered Bicycle Lane
- Bikeable Shoulder
- Separated Bicycle Lane
- Shared Lane
- Bicycle Route
- Shared Use Path

Facility Status

- Existing
- Planned
- County Boundary
- District Boundary

NOTE: For the purposes of this plan a designated bicycle route is considered a bicycle facility type, even though it involves a shared travel lane.

Figure 16. Existing Local Facilities in the San Antonio District

Most designated bikeways along TxDOT roads in the San Antonio District are located in Bexar County and within the City of San Antonio. As the district's agricultural and industrial lands are primarily located outside of the Interstate 410 loop (I-410), the surrounding counties are more rural and have relatively fewer on-system bikeways. These counties do have bikeable shoulders on rural highways, however, with Atascosa, Uvalde, and Wilson counties each hosting more than a hundred miles of shoulder bicycle lanes.



Figure 17. Bicyclists on Austin Highway (SL 368)

Table 1. Existing On-System Bikeways by County (Centerline Miles)

Facility Type	Atascosa	Bandera	Bexar	Comal	Frio	Guadalupe
Shared Use Path	0	0	0.6	1	0	0
Separated Bike Lane	0	0	0.1	0	0	0
Buffered Bike Lane	0	0	1.1	0	0	0
Bike Lane	0	0	32.5	8.3	0	1.1
Bike-Accessible Shoulder	150.3	69.7	226.9	94.7	57.3	93.4
Shared Lane	0	0	9.9	0	0	0
No Bikeway	256.4	125.6	509.3	145	246	287.4
Total Roadway miles	406.7	195.3	780.5	249	303.3	381.9

Facility Type	Kendall	Kerr	McMullen	Medina	Uvalde	Wilson
Shared Use Path	0	0	0	0	0	0
Separated Bike Lane	0	0	0	0	0	0
Buffered Bike Lane	0	0	0	0	0	0
Bike Lane	0	2.4	0	0	0	0
Bike-Accessible Shoulder	35.1	104.1	73.7	95.7	136.6	122.3
Shared Lane	0	0	0	0	0	0
No Bikeway	144	170.3	86.1	217.6	206.8	205.7
Total Roadway miles	179.1	276.8	159.8	313.3	343.3	328

Note: Centerline miles refers to the total length of the roadways. By contrast, lane miles refers to the number of centerline miles multiplied by the number of lanes.

Safety Conditions for Bicyclists

Bicyclist-involved crashes in the San Antonio District are more frequent north of Highway 90, where more facilities are present. Outside of the City of San Antonio, crashes are clustered near New Braunfels, Kerrville, Floresville, Seguin, and Pleasanton, which are notably municipalities that provide bicycling infrastructure and encourage cycling, making them statistically more likely to have crashes involving bicycles. Table 2, below, shows the locations of bicycle-involved crashes from 2017 to 2021. During this period, 1,905 bicycle-involved crashes occurred within the district, resulting in 26 fatalities and 137 serious injuries. Of the total district bicycle-involved crashes, 25% occurred on the SHS, including 12 fatalities and 50 serious injuries.

As seen in Figure 19, while more crashes involving a bicyclist occur mostly within the I-410, those that occur outside of I-410 corridor are mainly on state and U.S. highways, where bicycle infrastructure is limited to highway shoulder lanes. This trend is a key safety challenge, as these roadways connect residents and visitors to major shopping, employment, and recreational destinations between cities and towns.

Several of these concentrated crash areas are located on existing or proposed BTT routes or other key segments that connect to municipalities outside of central San Antonio. As bikeways are implemented throughout the district, segments with higher concentrations of crashes will likely require greater degrees of protection and separation between modes.



Figure 18. Person Using a Motorized Scooter on the Shoulder of West Comal Street (BI 35E)

Crash Severity	District Total	On-System	On-System, Percent of District Total
Fatal	26	12	46.2%
Suspected Serious Injury	137	50	36.5%
Suspected Minor Injury	791	180	22.8%
Possible Injury	572	147	25.7%
No Injury	379	88	23.2%
Total	1,905	477	25.0%

Table 2. Bicycle-Involved Crashes by Severity

SAN ANTONIO DISTRICT: Bicycle-Involved On-System Crashes, 2017 to 2021

Bicyclist Crashes

- Fatality
- Severe Injury
- Minor Injury
- Other

- County Boundary
- District Boundary

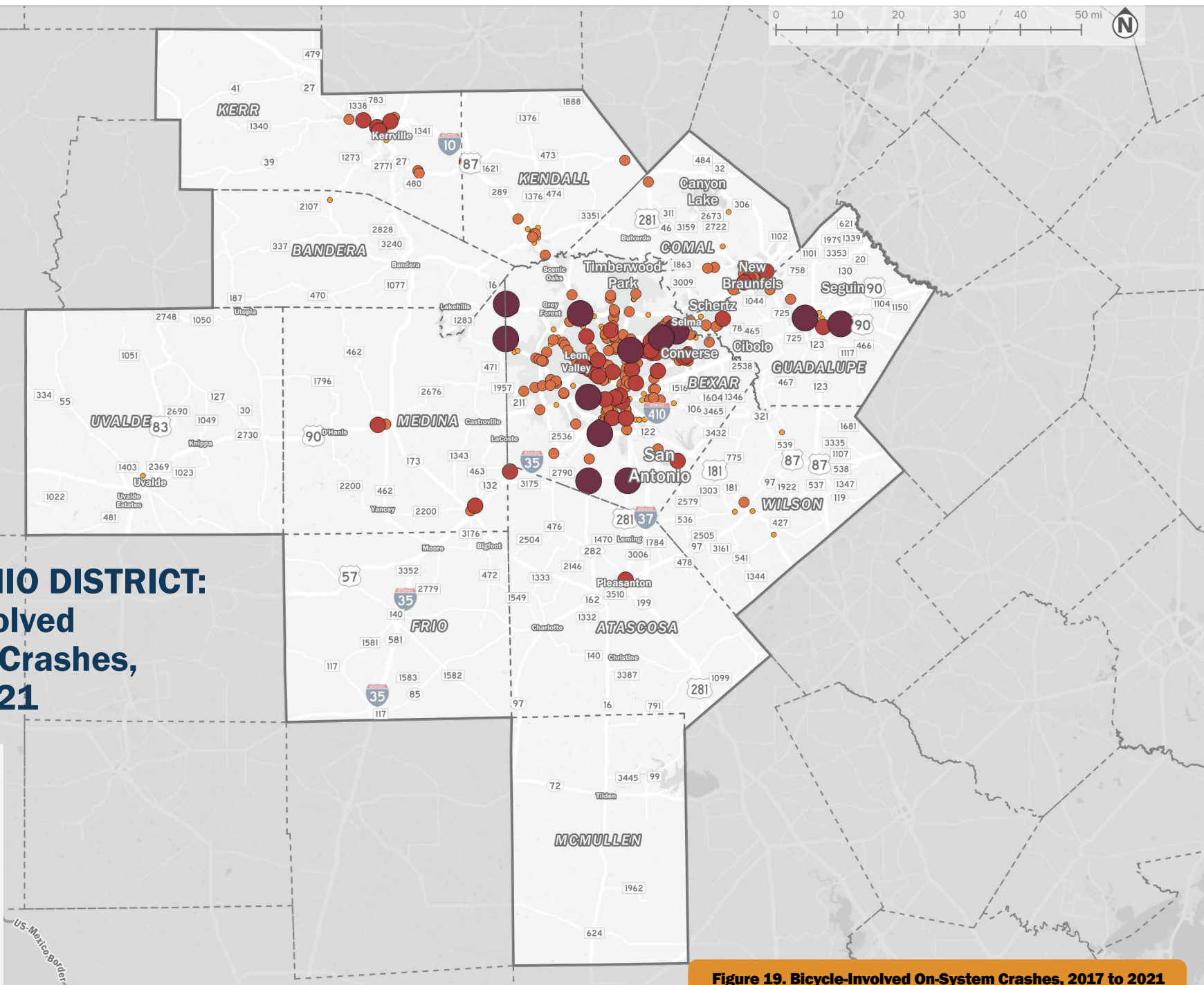


Figure 19. Bicycle-Involved On-System Crashes, 2017 to 2021

Local Plans and Policies

Local plans and policies can help TxDOT and local agency partners identify complementary opportunities to invest in bikeways that connect to and from larger networks, regardless of road ownership. A number of local and regional plans within the San Antonio District shape bicycling-related projects and policies. In addition to the San Antonio District Bicycle Plan and Implementation Strategy, which envisions a future in which bicycling is an integral facet of the entire San Antonio-Bexar County transportation region, several smaller municipalities have created plans and guidance to expand bicycle networks and address gaps in the current facilities, such as the Kerrville 2050 Comprehensive Plan, the Seguin Master Thoroughfare Plan, and the Boerne Master Plan. Another notable example is the City of New Braunfels, which revised its Hike and Bike Trail Plan in 2020 to utilize existing land use knowledge, GIS data, and current conditions to present an accurate and detailed depiction of the proposed network.

Regional entities, such as the AAMPO, have also published studies, plans, and resolutions to help local jurisdictions achieve their bicycling and walking goals. Long-range and short-range plans (or Transportation Improvement Programs [TIPs]) by Metropolitan Planning Organizations (MPOs), including the Transportation Alternatives fund, also channel funding to projects that include infrastructure for active modes, although bicycle or pedestrian projects are not specifically listed in all plans. Within the TIP project selection process, a team of bicycle and pedestrian advisory committee members developed a scoring system for bicycle and pedestrian projects to fairly and accurately evaluate these projects alongside prospective transit and roadway projects. The FY2023-2026 final list of projects includes the construction of a Hike and Bike Trail along Dry Comal Creek in New Braunfels and the installation of bicycle lanes along Zarzamora Street in San Antonio. The 2016 Regional Bicycle and Pedestrian Planning Study categorizes recommendations for specific areas such as the City of



Figure 20. Priority neighborhood and greenway connections on Bandera Road

Boerne, New Braunfels, and Seguin. Interconnected plans strive to make bicycling not just a mode of transport but a vibrant and integral part of the community's culture and identity.

AAMPO's 2009 Complete Streets Resolution "strongly encourages decision-makers in all jurisdictions to adopt and implement similar 'Complete Streets' policies and practices" in support of improved transportation access, air quality, and quality of life. This direction is being realized as Complete Street projects are planned and implemented in the region. Through these documents, the San Antonio District has laid a robust policy foundation for bicycling infrastructure and active modes projects.

FOUR

Needs Assessment



Defining Bicycling Needs

Geographic data from TxDOT and other public sources provide insight into places where on-system bikeways and roads may not meet the needs of people traveling by bicycle. These locations are classified into need types according to specific conditions that indicate the relevant bicycling-related needs. Some bikeway needs are mapped as segments of an existing route, while other types of needs are points representing intersections or other crossing locations. Where geospatial data on planned bikeway projects was available, those projects were included in the needs analyses to identify where connections to planned local bikeways are most needed along on-system corridors. Because interstates and other limited-access facilities in urban areas are generally not intended for use by bicyclists, most need types apply only to on-system roads that are designed as at-grade arterials

Types of Bicycle Needs

- High-Stress Bikeway:** This analysis identifies at-grade segments of the on-system network where bikeways exist, but conditions will be stressful for most riders. It uses roadway data such as bikeway design, number of lanes, traffic volumes, and posted speeds to calculate a Bicycling Level of Traffic Stress (LTS) score of 1 to 4. A road segment that scores LTS 1 is considered comfortable for all users, while a road segment scored LTS 4 will likely be too stressful for all but the most experienced riders. A segment is considered a high-stress bikeway if the LTS score is 3 or 4.
- No Bikeway:** This analysis identifies at-grade segments of the on-system network that do not have bikeway facilities or bikeable shoulders. A person riding along these roads would need to share a travel lane with vehicles or use sidewalks if available. While not all such locations are near places that generate or attract bicycle trips, they should be identified as routes that may not be bikeable for most users.
- Gap Between Existing Bikeways:** This need type occurs where a gap exists between two bikeways segments along an at-grade route. A gap in a bicycle facility introduces stress into the riding experience, discouraging riders from taking a route that might otherwise serve them well.
- Access to Schools:** This analysis identifies at-grade segments of the on-system network that may not meet the bicycling needs of students attending nearby schools. Within 2 miles of a K–12 school (where school districts do not typically provide school bus services), it identifies road segments without buffered or separated bikeways that would support safe and comfortable bicycle trips for young riders. Higher-education schools serve adult students who are typically able to ride longer distances and navigate a wider range of bikeways. This need type also locates road segments within 3 miles of a higher education school that do not have bikeways of any kind, including bikeable shoulders.
- BTT Needs:** BTTs are routes that TxDOT has recommended for inclusion in a statewide bicycle tourism network. They traverse urban and rural areas, which have different standards for how bicycle trips should be accommodated. In urbanized places, BTT needs are identified along routes with LTS scores of 3 or 4. In rural areas, BTT needs are identified where road shoulders are narrower than 8 feet (the standard the state has set for BTT routes with shoulder bikeways).

- **Lack of Crossing Opportunity:** Where intersections and grade-separated crossings are sparse, highways and other on-system roads become barriers for people who are trying to bicycle from one side of the highway to another. This need occurs on road segments where bicyclists must make long out-of-direction detours to find an opportunity to cross the highway.
- **High-Stress Crossing:** This need locates points on the on-system network where a crossing exists but people bicycling may find it uncomfortable. This version of the LTS analysis considers factors such as traffic volumes, type of traffic control, presence of a median island, number of lanes, and posted speeds. Crossings with an LTS of 3 or 4 are considered to be high stress.
- **Water Crossing Need:** Waterways can act as natural barriers for all travelers, making bridges and other crossings critical to providing connected networks. This need type identifies points where a state-owned road crossing a stream or river does not provide a bicycle facility (and is not adjacent to a bikeable bridge on a frontage road). Because bridges can be more challenging and expensive to improve than other parts of the road network, it is important to determine whether a bridge project should include bikeways before a project is fully designed.
- **Locally Identified Needs:** Locally identified needs reflect the local knowledge of TxDOT, its agency partners, and the communities they serve. These segments and points indicate places where new or improved bikeways should be considered, often drawing on qualitative data and public input. Locally identified needs include bikeway networks; projects from local plans; or locations where TxDOT staff are aware of bicycling gaps, deficiencies, or community requests for improvements. TxDOT staff considered public survey input when determining locally identified needs.

TxDOT and the TWG reviewed the data-driven needs assessment and used local knowledge to add needs that had been missed or remove needs that are being resolved through another project.



Bicycle Needs in the San Antonio District

The bicycle needs identified in the San Antonio District indicate how and where the current design and use of the SHS might discourage bicycle trips. For example, existing bikeways in central Bexar County may feel uncomfortable for many users due to roadway conditions, while the key barrier in more rural areas is often the lack of bikeways. BTT segments may need improvements to meet long-distance riding needs.

Figure 21 demonstrates how multiple types of needs may be closely spaced or overlap, creating barriers to comfortable, safe bicycling in local communities. TxDOT and the TWG reviewed the data-driven needs assessment and used local knowledge to add needs that had been missed or remove needs that are being resolved through another project. The map shown in Figure 22 depict locations of identified bicycling needs throughout the San Antonio District. Overall, over 87% of the SHS in the district exhibited at least one bicycling need. Consistent with the distribution of bikeways detailed above, “No Bikeway” was the most widespread need type, as the majority of TxDOT roadways in the district lack bikeable facilities. As a result, “Gaps Between Bikeways” (designated only where adjacent bikeways exist) was a rare need type, occurring for only 1.3% of on-system roadways. “Access to Schools” was the second most common need type, with locations concentrated in cities near school campuses along 32.2% of on-system highways.

Need Type	Miles	Percent of On-System Roadways
No Bikeway	2605.4	60.4%
Access to Schools	1388.0	32.2%
High-Stress Bikeway	694.8	16.1%
Lack of Crossing Opportunity	400.5	9.3%
Bicycle Tourism Trail	220.3	5.1%
Gaps Between Bikeways	54.5	1.3%
Locally Identified Need	51.0	1.2%
Manually Identified Need	403.3	9.4%

Table 3. San Antonio District Need Type Distribution

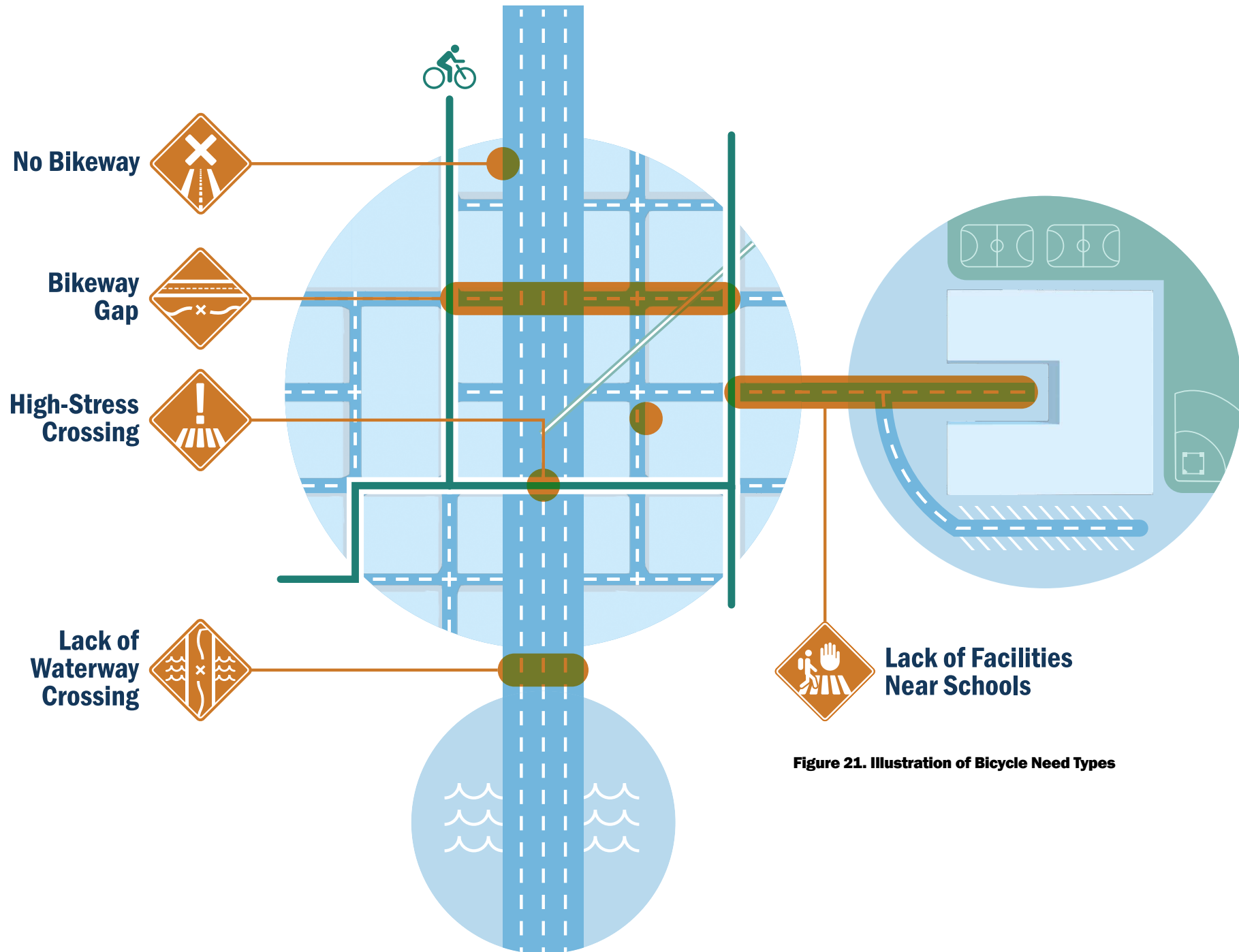


Figure 21. Illustration of Bicycle Need Types

SAN ANTONIO DISTRICT: Bicycle Needs

Needs per Segment

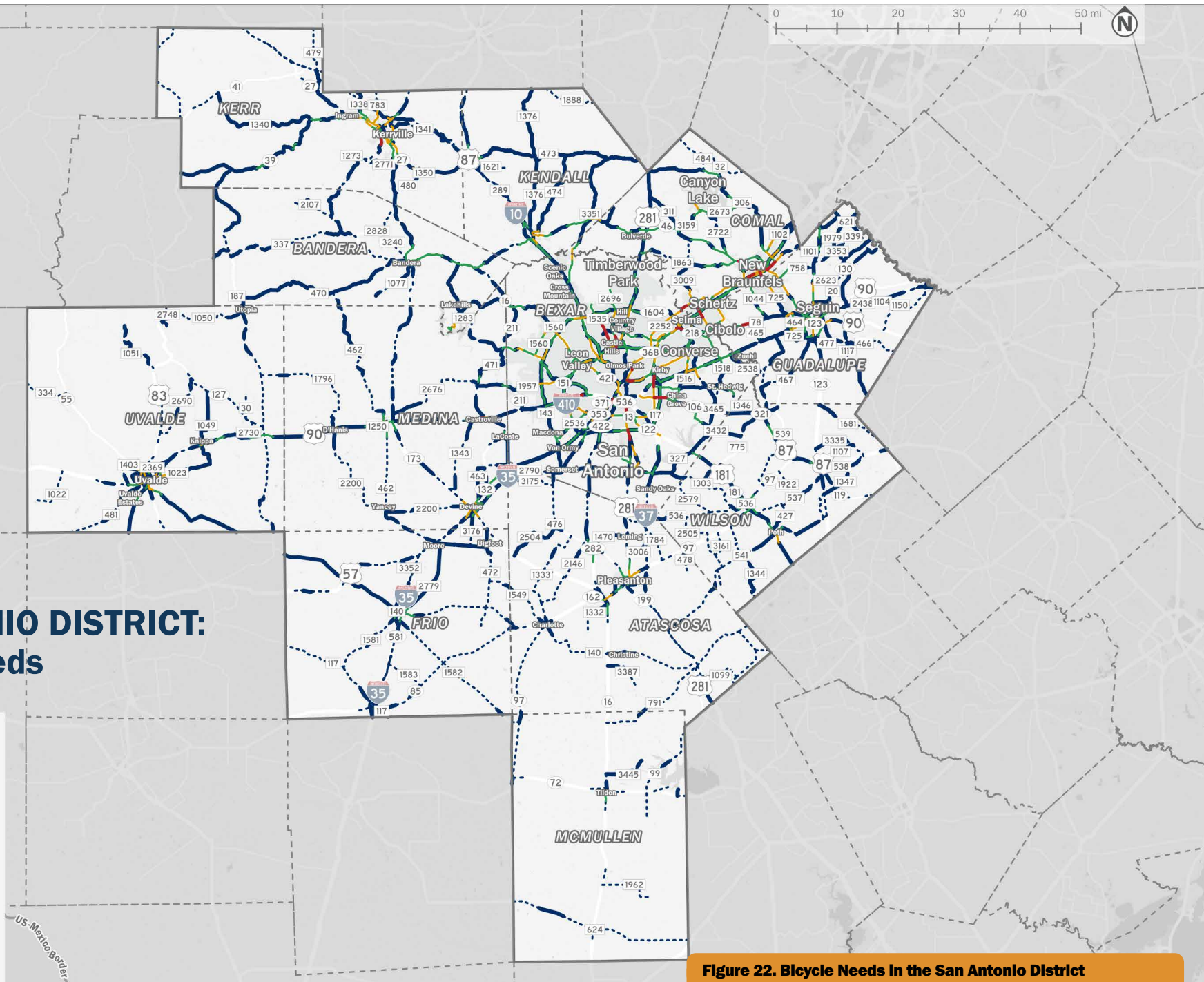
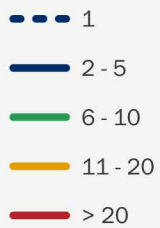


Figure 22. Bicycle Needs in the San Antonio District

FIVE

Bikeway Development Priorities



As discussed in the previous chapter, there are many locations in the San Antonio District's on-system network that may require improvements to provide connected and comfortable bikeways and crossings. To understand what design and operational changes will best meet the needs of nearby communities and the traveling public, TxDOT will need to advance specific locations into project development following the completion of this plan. Project development will allow TxDOT to evaluate options and select solutions based on detailed analysis and local public engagement, which are difficult to achieve in a district-wide planning effort.

To make the most of limited public funding, the project team developed a prioritization process to identify when and how the various bicycling need locations within the district should advance to project development. Prioritizing segments of the on-system network allows the San Antonio District to apply for and target funding towards improvements that will have the most impact. By comparing the potential benefits that improved bikeways and crossings could offer at different locations, TxDOT was able to identify where improvements could do the most to increase safety, improve system performance, and meet TxDOT's other statewide goals from the 2022 Strategic Plan. This prioritization process will help TxDOT pursue competitive funding opportunities and support projects that provide safety, economic, health, and other benefits to district residents.

It is important to remember that this plan prioritizes locations where bicycling needs exist; it does not recommend solutions for those needs, which would require more detailed study and local engagement than a districtwide plan can offer.

Goals for Biking in San Antonio District

(Adapted from the TxDOT 2023-2027 Strategic Plan goals)

1. **Promote Safety** – Champion a culture of safety.
2. **Deliver the Right Projects** – Implement effective planning and forecasting processes that deliver the right projects on-time and on-budget.
3. **Focus on the Customer** – People are at the center of everything we do.
4. **Foster Stewardship** – Ensure efficient use of state resources.
5. **Optimize System Performance** – Develop and operate an integrated transportation system that provides reliable and accessible mobility enabling economic growth.
6. **Preserve Our Assets** – Deliver preventive maintenance for TxDOT's system and capital assets to protect our investments.

Prioritization Methodology



Segmenting the System

The first step in the prioritization process was to divide the on-system network in the San Antonio District into segments 0.25 mile to 2 miles in length, which is the appropriate scale for future project development efforts. Segments generally start and end at clear landmarks that will be familiar to local community members, such as highway interchanges and at-grade intersections. Segments that contain at least one bicycling need proceeded into prioritization.

Using Prioritization Measures to Score Segments

As a second step, each segment on the network was scored based on a range of prioritization measures that align with the goals shown in Table 4. Some of these measures look at characteristics of the route itself that influence bicycling conditions, such as posted speeds or the presence of an existing bikeway. Other measures consider the characteristics of the surrounding community, such as the segment's proximity to schools or whether people are making short trips there today that could be accomplished by bicycling. Some measures identify opportunities to use public funding efficiently by combining bikeway improvements with other upcoming projects, such as repaving, signal replacements, or bridge repair.

Assigning Weights Based on Local Values

To reflect local values and preferences, the scoring calculations incorporated input from TxDOT district staff, members of the TWG, and members of the public who participated in online surveys. First, the statewide project team selected a set of goals and measures that every TxDOT District Bicycle Plan will use in prioritization. While most measures will be used by all districts, the list included a few optional measures that districts can choose to use if locally relevant. By using a consistent set of goals and measures in each TxDOT District Bicycle Plan, TxDOT ensures that all districts consider the same information.

The San Antonio District set customized weights for each goal and measure to reflect local values and input from stakeholders and the public, as well as the unique priorities of the district (Table 4). This allowed the analysis to elevate the benefits that are most important to the district's partners and communities.

Goal Area	Weight	Spatial Analysis Measures
Promote Safety	40%	<ul style="list-style-type: none"> Crash locations where people walking or bicycling were injured or killed Proximity to K–12 schools, recreation centers, and community centers serving youth and older adults Higher posted speed limits
Deliver the Right Projects	15%	<ul style="list-style-type: none"> Number of bikeway needs present on a segment Number of programmed upcoming TxDOT projects Improvements that could close gaps between existing bikeways
Focus on the Customer	10%	<ul style="list-style-type: none"> Locations with higher numbers of public comments in winter 2022 to 2023 TxDOT District Bicycle Plan survey
Optimize System Performance	15%	<ul style="list-style-type: none"> Areas where people make more trips of 3 miles or less Near local destinations such as supermarkets, libraries, healthcare, universities, and parks Connects to existing and planned local bikeways Connects to transit stops and stations
Preserve Our Assets	10%	<ul style="list-style-type: none"> Bridge quality Pavement quality
Foster Stewardship	10%	<ul style="list-style-type: none"> Areas with greater densities of residents Areas with greater densities of jobs Near communities in need of affordable transportation options Near communities exposed to high-crash and high-traffic corridors Near communities with high rates of health issues like asthma and heart disease Near historic destinations like museums and landmarks

Table 4. Weighting Factors for the San Antonio District

Geographic Equity

TxDOT districts have land uses and highways that span communities of many sizes, from major cities to small towns and large rural areas. Several prioritization measures had the potential to elevate dense urban areas above other types of communities. To highlight the high-benefit locations across communities of all sizes, the project team created a geographic-equity methodology that corrected for potential bias in the analysis. Segments of the highway network were sorted into groups based on the population size of the surrounding area. After segments received initial prioritization scores, the analysis compared the range of scores achieved by segments that were located within similarly sized communities. By identifying the highest scoring locations within each community size grouping, this geographic equity adjustment elevated high-benefit locations for communities of all sizes.

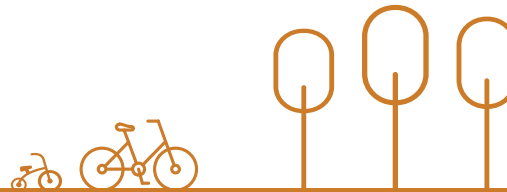
Refining Technical Analysis with Local Knowledge

The San Antonio District staff reviewed the draft prioritization results and shared them with the TWGs, CNWGs, and the public. After considering the feedback they received, they then refined the prioritization results through two types of adjustments:

- **Data-driven adjustments:** changing goal and measure weights to reflect local values more accurately.
- **Qualitative adjustments:** manually reassigning a specific location to a different priority category to reflect public input, partner support, or knowledge of opportunities and constraints not fully captured by the available data.

Population Size Categories Used to Apply Geographic Equity Analysis:

- Rural (under 2.5K)
- 2.5-10K
- 10-25K
- 25-50K
- 50-100K
- 100-250K
- 250-500K
- 500K+



Bikeway Development Priority Categories

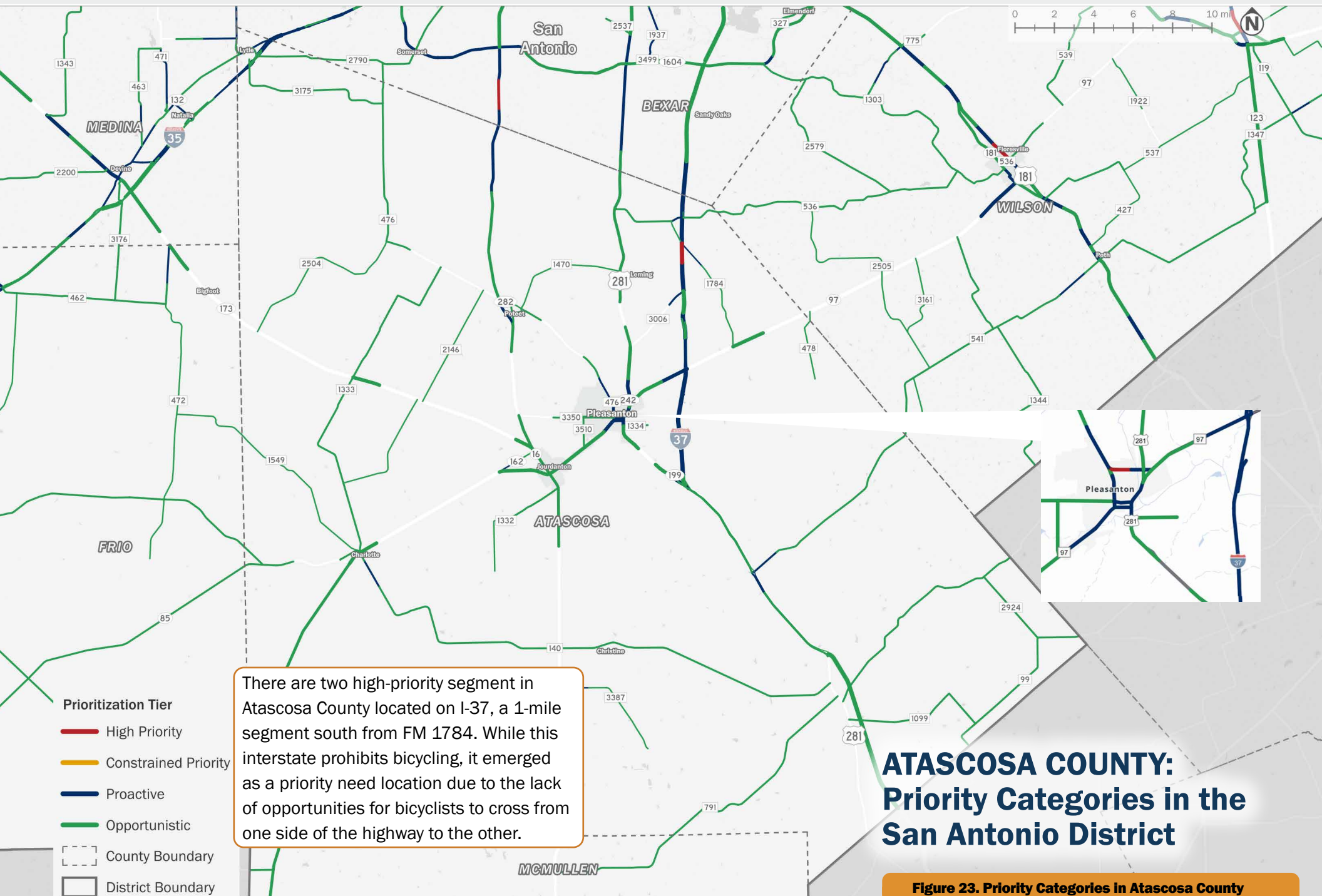
The following maps show the San Antonio District's priority locations for improving bicycling conditions where needs exist. These priority categories will guide how and when TxDOT develops and funds bicycle projects on its highways.

Table 5. Priority Categories

Opportunistic Improvement	Proactive Improvement	Constrained Corridor	High-Priority Improvement
Percent of San Antonio District need segments assigned to this category: 85.4%	Percent of San Antonio District need segments assigned to this category: 14.3%	Percent of San Antonio District need segments assigned to this category: 0.0%	Percent of San Antonio District need segments assigned to this category: 0.3%
Description: Locations where bikeways should be improved when another project is planned in that location.	Description: Locations where the benefits of improving bikeways merit standalone development of a bikeway project, with funding opportunities in mind.	Description: Locations identified as high priority but are known to have significant barriers to improvements such as ROW limitations, utilities, lack of local support, etc.	Description: Locations where bikeways should be improved as soon as is feasible due to intensity of bicycling needs and potential benefits.
Why this category? In every state, projects like reconstruction, rehabilitation, and maintenance create cost-effective opportunities to support bicycling. With limited public dollars available to meet the needs of all travelers, locations where bicycling needs are less urgent may wait for another project to provide an opportunity.	Why this category? Federal programs are expanding available funding for improving bikeways. Where prioritization shows that there are high benefits to meeting bicycling needs, TxDOT and its partners should develop a preferred design solution they can use to request funds or apply for grants.	Why this category? This category designates locations that score highly to indicate that it is a high-priority location. However, due to known challenges, improvements are not likely to be advanced in the near term.	Why this category? Between high-scoring locations within the district, a few rose to the top through a combination of technical analysis and public feedback. These are places where communities, agency partners, and TxDOT feel it is most important to advance bikeway improvements in the near term.

Taken together, these categories allow TxDOT to focus near-term efforts to improve bikeways where they will do the most good, while maintaining awareness of the opportunities provided by expanded federal funding and efficiencies offered by other nearby projects. For more information on funding sources and implementation, see Chapter 8.

Figure 23 to Figure 34 show the locations of prioritized segments within the San Antonio District. Due to the geographic-inclusivity-based ranking, these are distributed throughout the district. Within the City of San Antonio, Austin Highway/SL 368 is a highly desired high-priority segment. The roadway hosts a commercial corridor and connects central San Antonio with I-35 to New Braunfels and beyond. Pedestrians and Cyclist have been noted using the wide shoulders from the five lane roadway to get to places although several “No Pedestrian” zones exist due to lack of infrastructure and safety concerns.



BANDERA COUNTY: Priority Categories in the San Antonio District

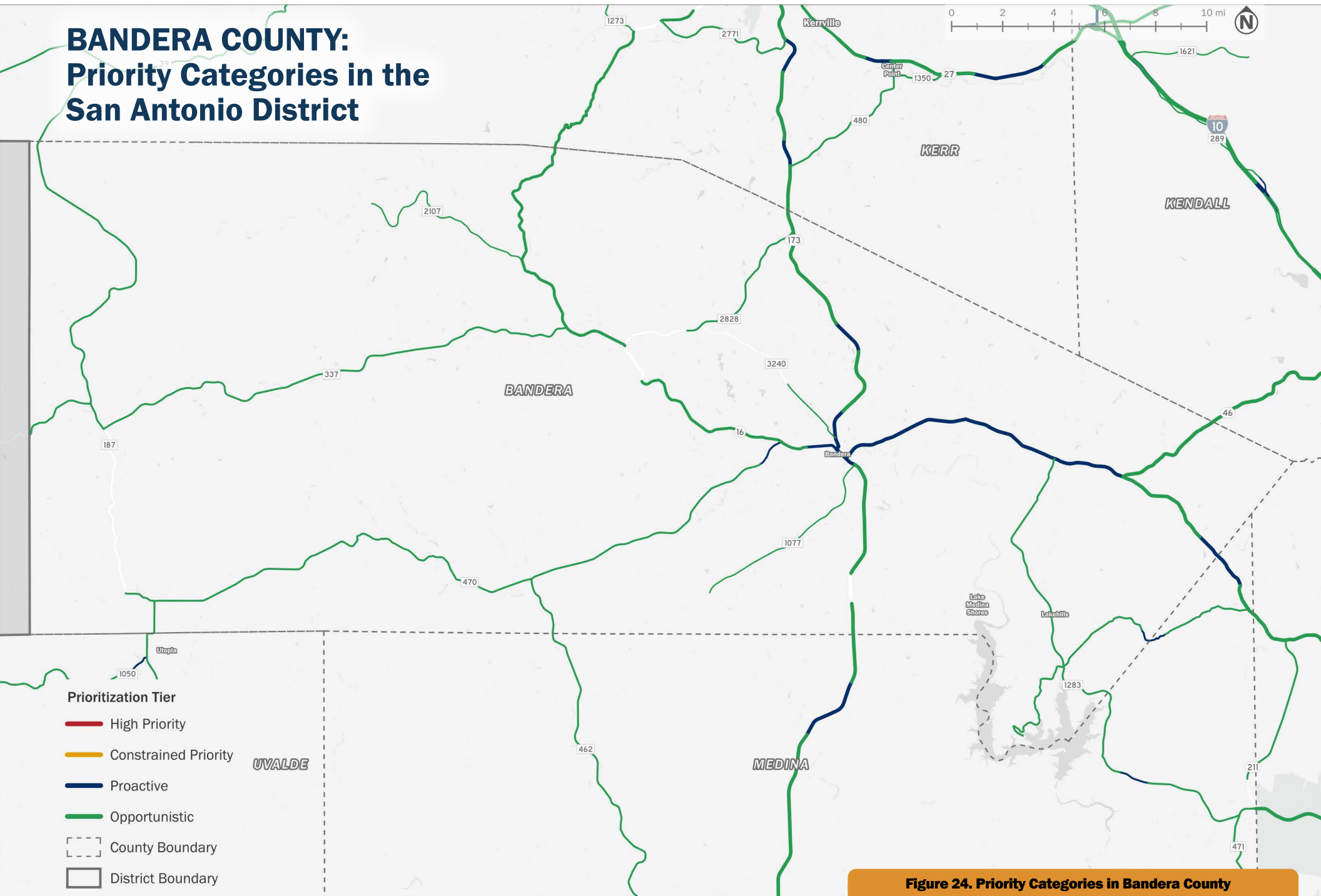
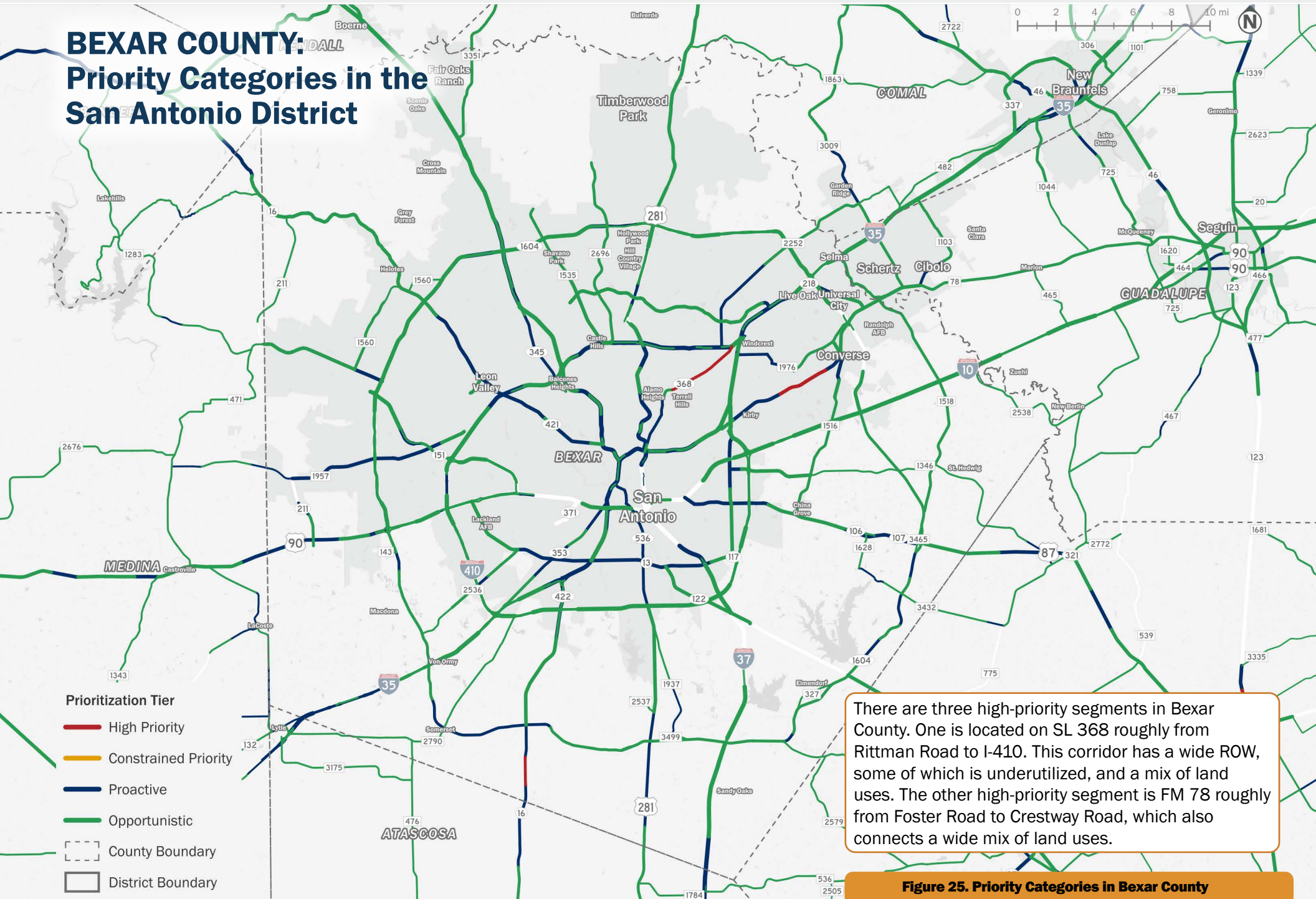


Figure 24. Priority Categories in Bandera County

BEXAR COUNTY: Priority Categories in the San Antonio District



COMAL COUNTY: Priority Categories in the San Antonio District

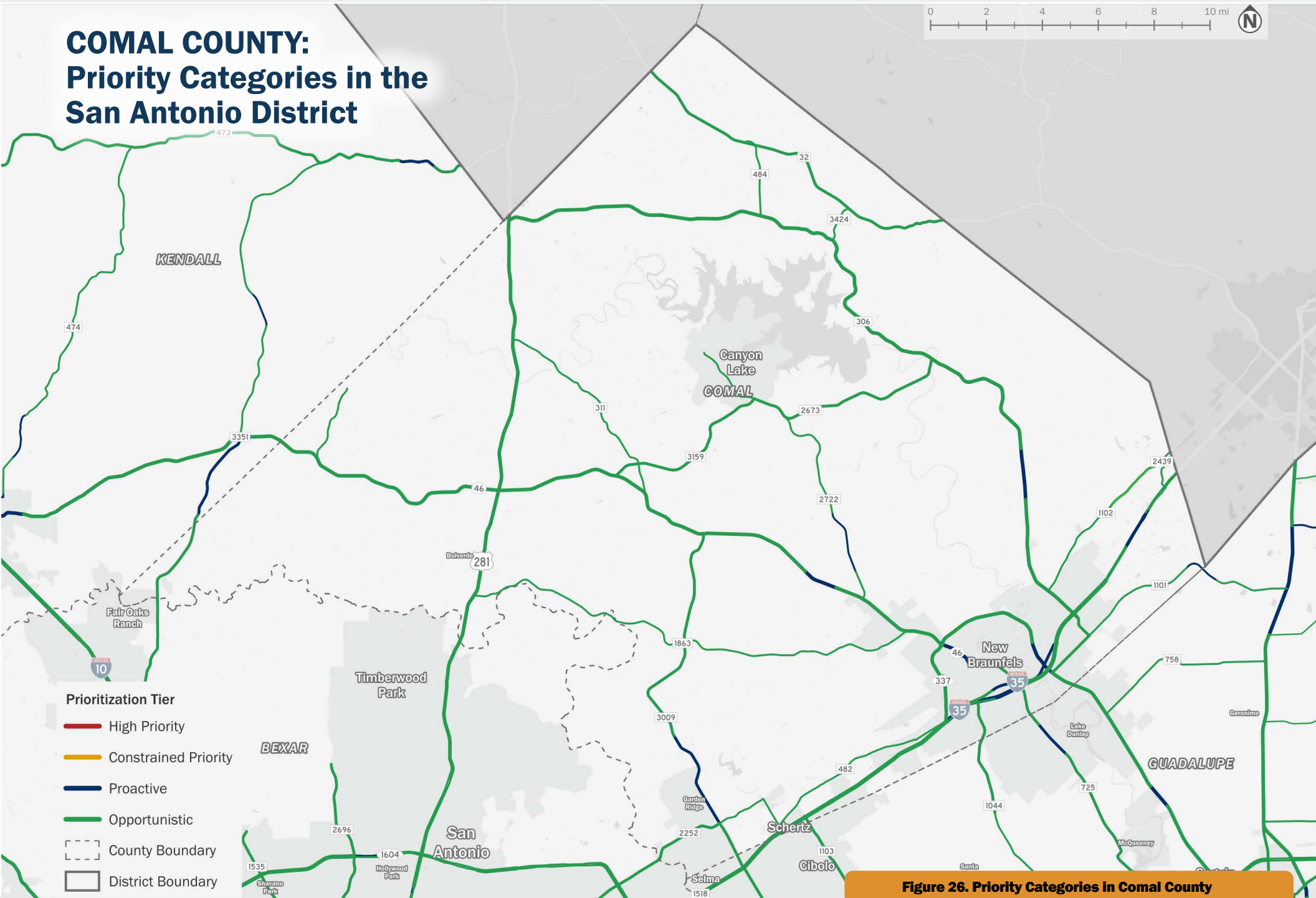


Figure 26. Priority Categories in Comal County

FRIO COUNTY: Priority Categories in the San Antonio District

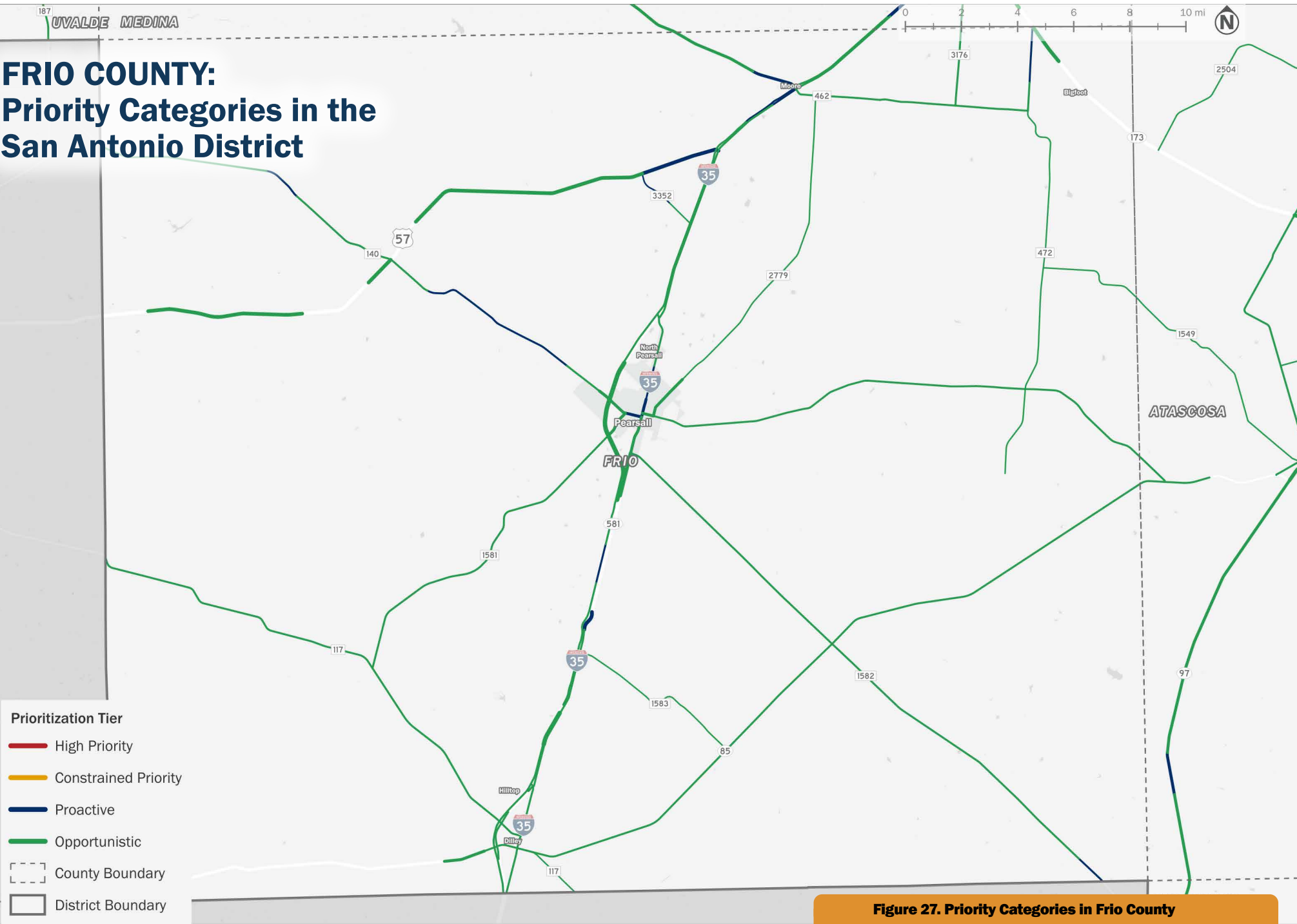


Figure 27. Priority Categories in Frio County



Figure 28. Priority Categories in Guadalupe County

KENDALL COUNTY: Priority Categories in the San Antonio District

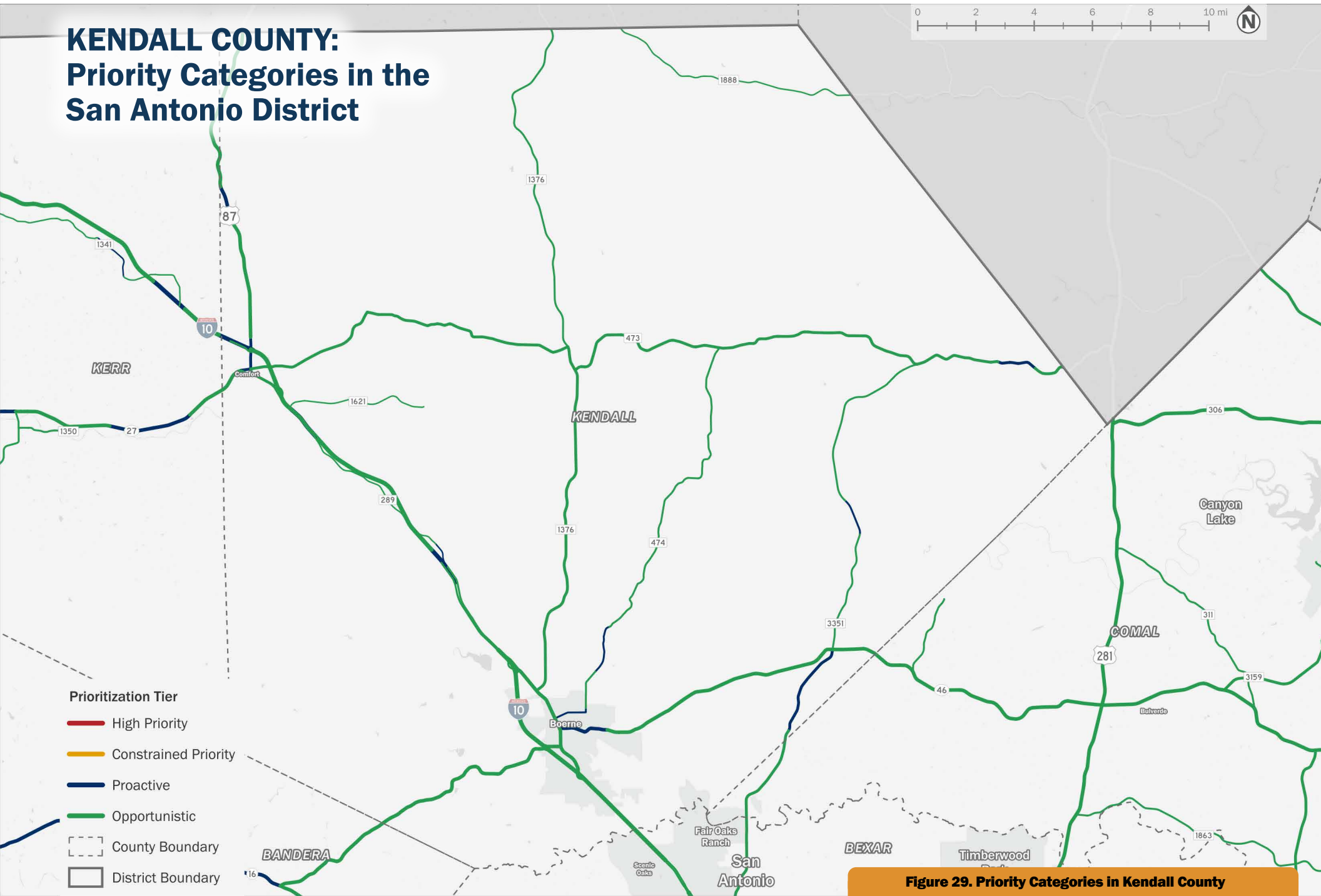


Figure 29. Priority Categories in Kendall County

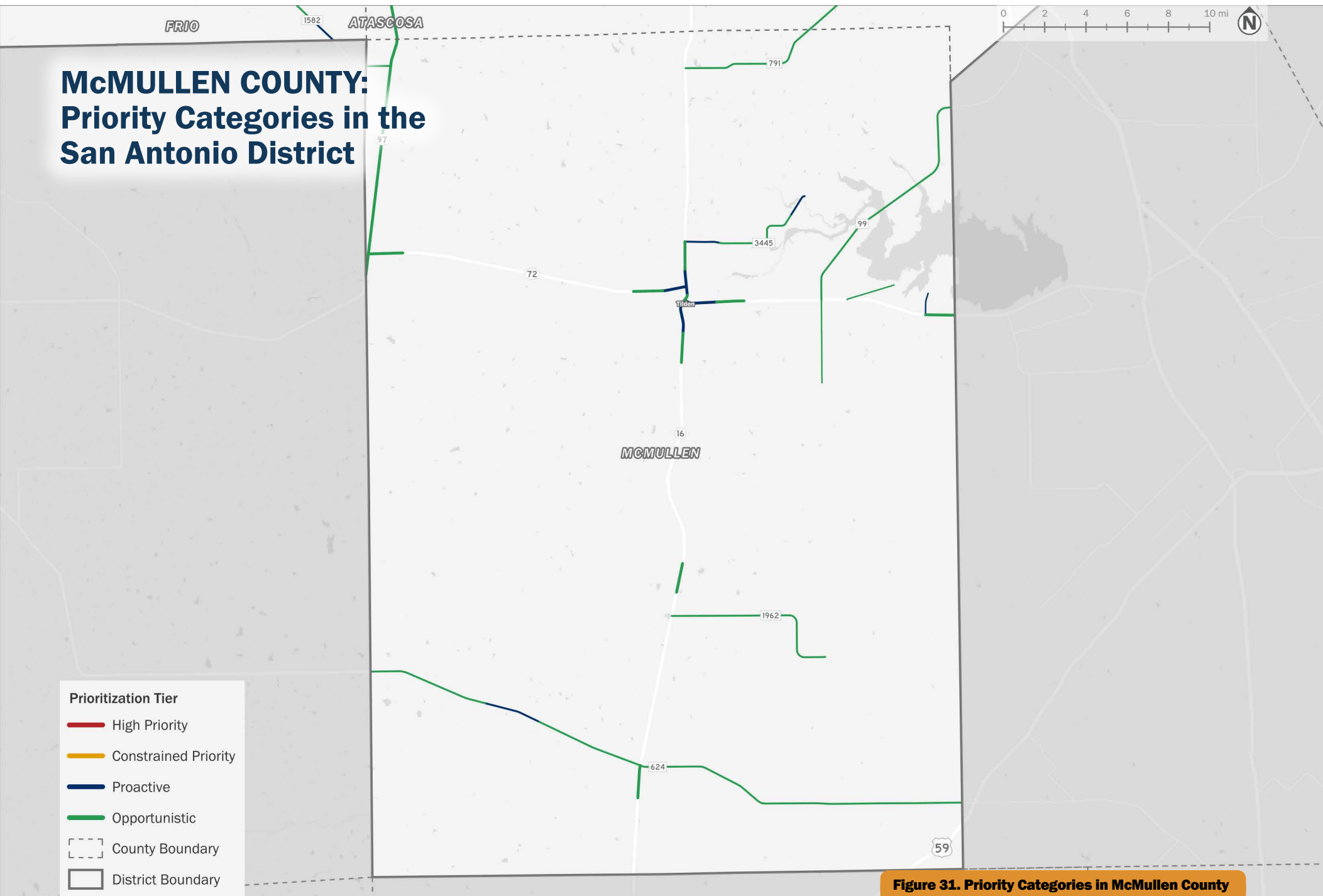
KERR COUNTY: Priority Categories in the San Antonio District

Prioritization Tier

- High Priority
- Constrained Priority
- Proactive
- Opportunistic
- County Boundary
- District Boundary

A high-priority segment is located in Kerrville on Main Street, which functions as the primary corridor for the town as well as a popular bicycling corridor. The segment has a shoulder and serves a number of local destinations such as grocery and retail stores.

Figure 30. Priority Categories in Kerr County



MEDINA COUNTY: Priority Categories in the San Antonio District

There is one high-priority segment located in Medina County on Avenue E from 19th Street to 30th Street. This corridor has a history of crashes involving bicycles and pedestrians.

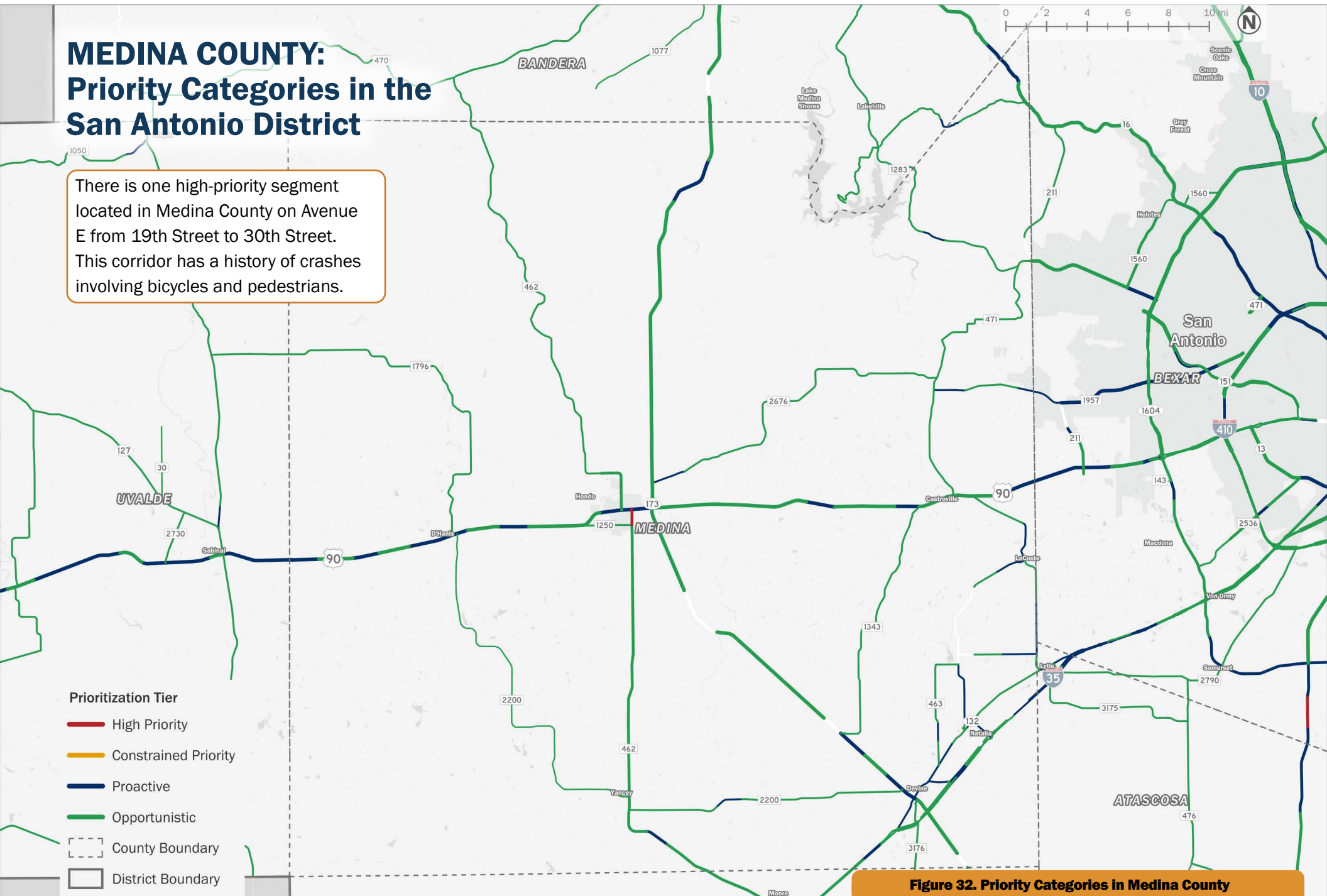


Figure 32. Priority Categories in Medina County

UVALDE COUNTY: Priority Categories in the San Antonio District

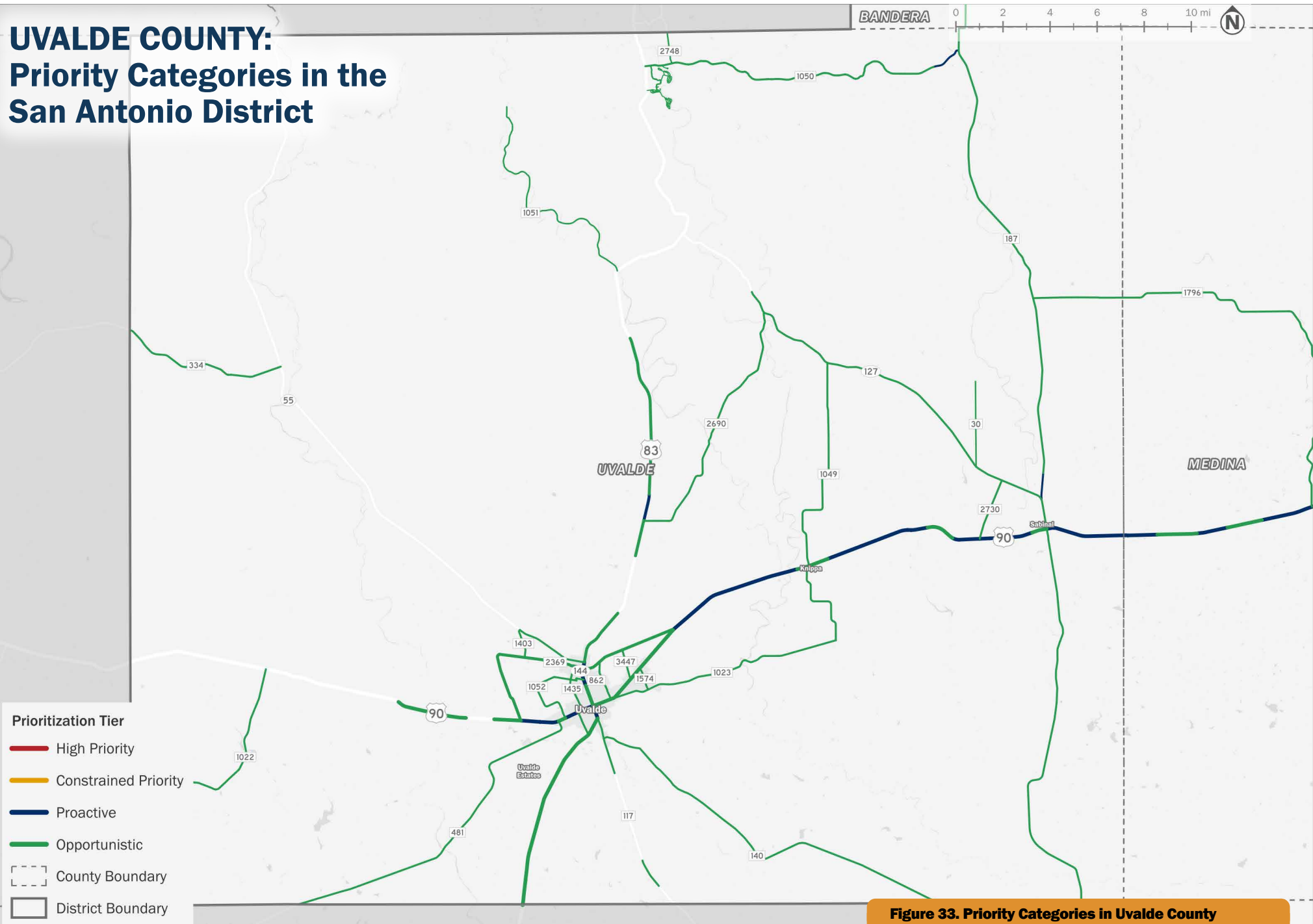
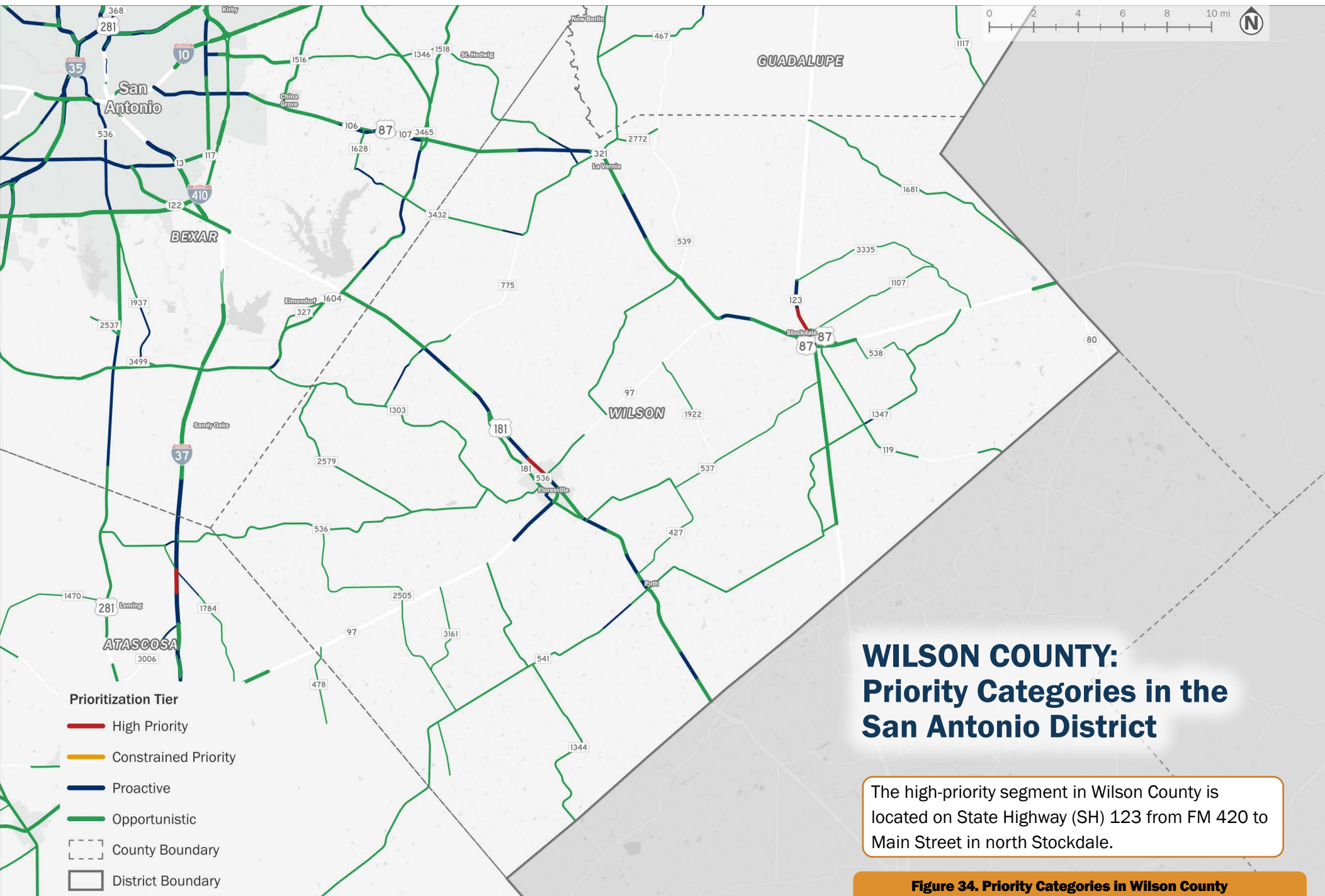


Figure 33. Priority Categories in Uvalde County



SIX

Bicycle Tourism Trails Network



Bicycle Tourism Trails Study

In 2018, TxDOT conducted the BTT Study to identify a statewide network of bicycling routes suitable for long-distance riders that would also provide local access within and between communities. Bicycle tourism is defined as any travel-based activity involving a bicycle, such as bicycle backpacking, long touring rides, or even recreational day rides. The study sought to develop a network of regional tourism trail routes, use research to establish bicycle-related tourism economic benefits, and foster implementation of longer routes that require coordination and partnership between neighboring regions. Long-distance recreational routes that connect to other states were also proposed, to be considered as candidates for future U.S. Bicycle Routes. The study development process proposed and prioritized a network of bicycle tourism routes with guidance from a statewide advisory committee, data-driven considerations of roadway suitability, and local and regional refinement from stakeholder groups.

This statewide network, called the BTT Example Network, presents a possible vision for tourism trails across Texas. It identified three scales of bicycle tourism routes:

- Cross-state Spines, which link major urban areas and inter-state bicycling routes.
- Connecting Spurs, which link major Texas and regional destinations.
- Regional Routes, which provide more local connections between smaller cities.



Figure 35. Texas Bicycle Tourism Trails Study (2018)

Refining San Antonio's Bicycle Tourism Routes

As part of the San Antonio District Bicycle Plan development process, the project team took advantage of a more nuanced set of data on bicycling needs and conditions to review and refine the Example Network Routes for the San Antonio District. First, the project team used the needs analysis to identify portions of the BTT Example Network with significant barriers, such as high-stress locations or bridges with no bikeways. These were places where it was worth looking for alternative routes that avoided barriers or provided more comfortable connections. By mapping recreational destinations (such as parks, campgrounds, and open spaces) as well as places where travelers could get services (such as community centers and groceries), the team considered where the Example Network could be adjusted to improve access to these resources. New routes were selected and existing routes adjusted where the team found opportunities for better connections to destinations that avoided difficult barriers. Site visits to select potential BTT routes, such as FM 78 to Seguin, were conducted to review conditions for suitability and existing bicycling comfort. Proposed BTT refinements were reviewed by the TWG, TxDOT District staff, and the public, then adjusted to best align to local priorities and projects.

San Antonio District Proposed Refinement



The proposed BTT Example Network within the San Antonio District addresses connectivity to municipalities and key destinations across the district. The 2018 BTT Example Network included a north-south statewide spine route through the district that connects to Dallas in the north and Brownsville to the south as well as a regional route to the west that connects to Uvalde. Other destinations and towns, however, lack connections to the BTT Example Network.

BTT Refinement Map

Figure 36 illustrates the proposed refinements to the BTT Example Network in the San Antonio District. The proposed adjustments would avoid high-stress crossing barriers and routes with high truck volume while connecting riders to more destinations and travel facilities. The proposed routes would also utilize calmer and more pleasant river greenways and trails to connect to additional municipalities. Key destinations that would be accessible via the proposed BTT Example Network include Seguin, Pleasanton, Bandera, and Utopia.

The most significant proposed addition to the BTT Example Network is the new route along Ranch to Market Road (RM) 1050, FM 470, and SH 16 from near US 83 to the San Antonio River Walk. The 95-mile route is largely rural and provides an additional, more direct western route that connects to Government Canyon State Natural Area, Garner State Park, Bamberger Nature Park, Monterrey Park, Utopia, and Bandera. In addition to connecting to desirable tourist destinations, this route consistently provides amenities such as restaurants and rest stops as it passes through small towns. The

next-longest proposed route is along Farm to Market Road (FM) 78 from central San Antonio to Seguin. This 43-mile route passes through trails within each city, and small towns and rural landscapes and connects to eastern destinations of the San Antonio BTT Example Network.

The 40-mile proposed route on SH 16 is intended to replace the existing BTT on SH 39; this is the largest suggested route relocation from the refinement process. The current route has high usage but also high truck volumes and limited sight distance and lower safety due to the multiple curves. Other proposed realignments, such as in Floresville and near Pleasanton, also utilize safer routes that connect to additional destinations.

Challenges remain, such as high-speed and high-volume truck traffic on SH 173, narrow bicycle shoulders on SH 16, and limited ROWs in multiple towns and destinations. For these areas, higher investment in facilities or higher tolerance for discomfort is required for full connectivity.

San Antonio District: Bicycle Tourism Trail Refinement

Bicycle Tourism Trails

- 2018 Route
- New Route
- - - Realigned Route (New)
- Proposed for Removal
- - - Realigned Route (Removal)
- County Boundary
- District Boundary

KERR

BANDERA

KENDALL

San Antonio

BEXAR

COMAL

Schertz

Live Oak

Converse

Cibola

St. Hedwig

GUADALUPE

WILSON

Sandy Oaks

Pleasanton

ATASCOSA

MCMULLEN

Tilden

Charlotte

Frio

Pearsall

Medina

Uvalde

Uvalde Estates

Castroville

Lytle

Macdonald

Von Ormy

Lockland

Fair Oaks Ranch

Bulverde

Canyon Lake

New Braunfels

Seguin

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Bulverde

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New Braunfels

Seguin

Schertz

Live Oak

Converse

Cibola

St. Hedwig

Table 6. Proposed BTT Refinements

Refinement #	Location	Consideration Type	Length (miles)	Destinations
1	SL 181, US 181	Realignment	7	Floresville River City Park, connection to SL 181 and US 181
2	Medina River Greenway	Refinement	4	Connect to San Antonio, Missions National Historical Park
3	Rockport Road	Refinement	1	N/A
4	FM 476	New Route	8	Access to destinations in Pleasanton (historical markers)
5	SH 16	Refinement	40	N/A
6	RM 1050, FM 470, SH 16	New Route	95	Government Canyon State Natural Area, Garner State Park, Bamberger Nature Park, Monterrey Park; access to destinations in Utopia and Bandera (parks, historical markers, museums)
7	FM 78	New Route	43	Southside Lions Park, Martin Luther King, Jr. Park, Jack White Park
8	Great Springs/New Braunfels Dry Comal Greenway Trail	Refinement	7	Great Springs/New Braunfels Dry Comal Greenway Trail, Fourmile Creek natural area
9	Judson Road, Nacogdoches Road	Refinement	2	Connections to nearby parks and schools
10	Rittiman Road, Salado Creek Greenway	Refinement	2	Salado Creek Greenway
11	Avenue B	Refinement	1	Lower stress/higher comfort facility on Mulberry Ave
12	SH 46, Comal Avenue, Porter Street	New Route	13	Seguin

Seven

Bikeway Functions and Design Selection



Bikeway functions are the last component of the planning resources produced in the San Antonio District Bicycle Plan. Using geographic data, the project team assessed who might want to bicycle along different parts of the on-system network based on nearby destinations and travel activity. Different groups of users benefit from different design approaches—for example, a child may need a very protective bikeway to safely ride to elementary school, while someone on a multi-day bicycle camping tour may be satisfied with a wide and well-paved road shoulder.

Bikeway functions provide useful guidance when initiating a project and selecting an appropriate bikeway design. They are also useful for design decisions around separation, width, intersection improvements, and maintenance. The Bikeway Design User Guide, described on page 64 is a detailed decision-making tool that describes how designs should adapt to the needs of different users and the surrounding environment.

Bikeway Function Categories

The map below shows how different state-owned routes serve different types of users based on nearby destinations and how people travel in the area today. Proposed functions were developed through spatial analysis then refined by TxDOT staff using feedback from agency partners and the public.

The bicycling function categories are:

- All-Ages Bikeway:** Routes near community destinations serving children, older adults, or people with disabilities. These routes need more separation and protection so vulnerable users can bicycle safely and comfortably.
- Daily-Travel Bikeway:** Routes in urbanized areas, which contain more closely spaced destinations. These routes should be designed to support frequent bicycling use so that people can make short trips to meet daily needs by bicycling.
- Long-Distance Bikeway:** Routes that are popular for recreational riding and bicycle tourism, or that connect destinations that could attract longer-distance riders. These routes should be designed to serve experienced bicyclists as well as families on adventures.
- Basic Bikeway:** Routes where only occasional bicycling is expected based on nearby population and land uses and where a basic design may be enough to meet occasional needs



Throughout the San Antonio District, all-ages bikeways are predominately located within the cities and smaller towns on roadways that most directly serve local destinations such as schools and community centers. Given the wide range of ages, and abilities of riders who use these facilities, all-ages bikeways within cities and towns should accommodate a range of comfort levels.

Daily-travel bikeways are less common in the district due to there being relatively few highway segments in urbanized areas that are not near all-ages community destinations. The daily-travel bikeways primarily serve to connect all-ages bikeways to create a continuous network within urban areas and between major bicycle hubs, such as between central San Antonio and Seguin.

Long-distance bikeways occur along the BTT Example Network in the San Antonio District. These segments are likely to serve long-distance recreational riders that are not already designated as all-ages bikeways or daily-travel bikeways. This includes SH 16 to Bandera.

Many other on-system roads outside of cities and towns have been identified as basic bikeways, such as SH-173, SH-46, and SH-93, which circle the region. Here, low population density and rural land uses suggest that few riders are likely to ride on the highway, but design elements should provide for the safety of occasional riders between towns.

Bikeway Functions



Figure 37. Bikeway Function Identification Methodology

SAN ANTONIO DISTRICT: Bikeway Functions

Network Functions

- All Ages
- Daily Travel
- Long Distance
- Basic
- Access Controlled
- County Boundary
- District Boundary

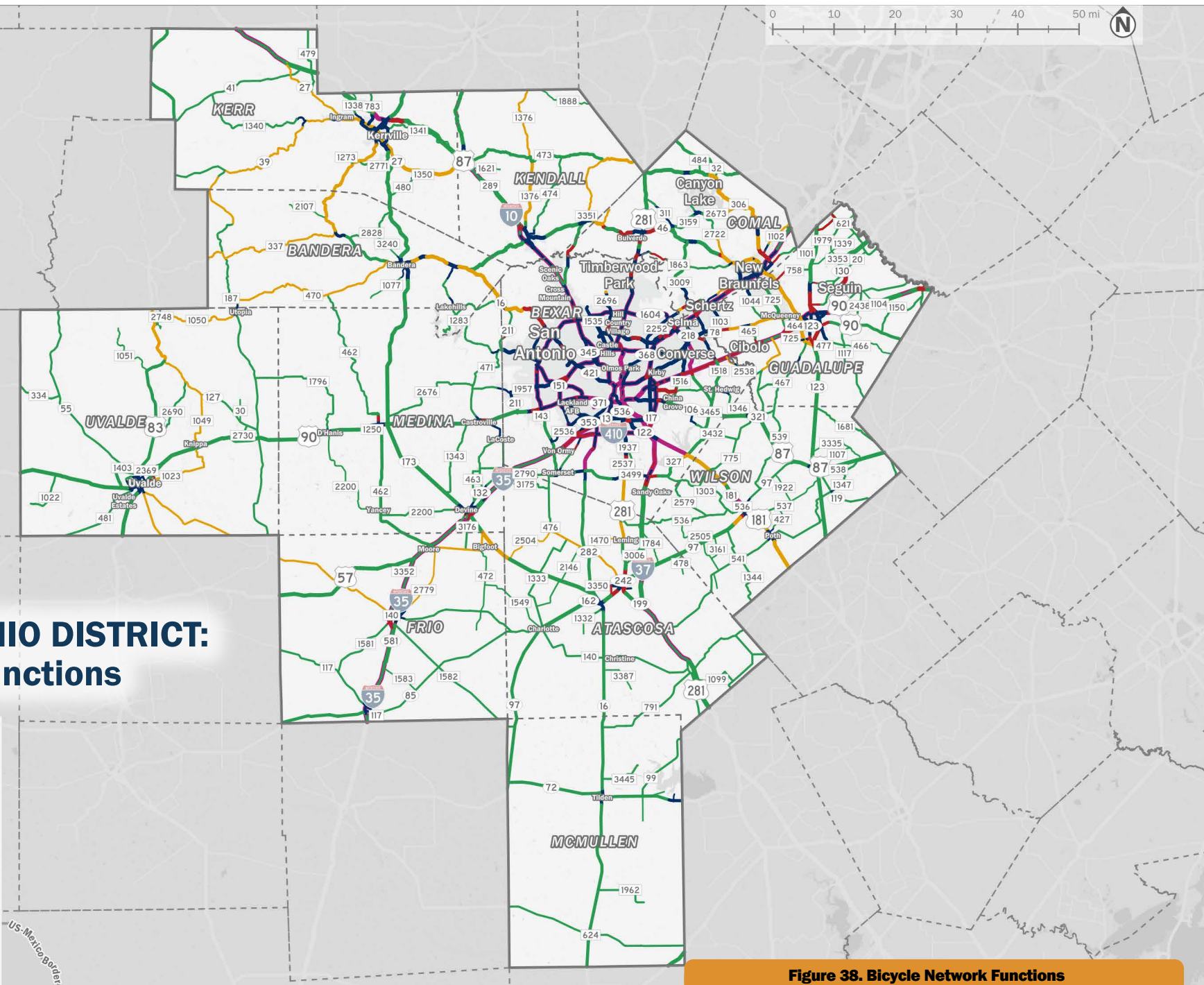


Figure 38. Bicycle Network Functions

District Overview

TxDOT has recently updated its Roadway Design Manual²⁰ to match new national standards and best practices for developing bikeways. While the San Antonio District Bicycle Plan was under development, the project team created a Bikeway Design User Guide to help TxDOT staff, agency partners, and the public consider what bikeway is the best fit for their location. It uses visuals and plain language to explain how to use community context and the Roadway Design Manual to design better bikeways and overcome design challenges.

Selecting and designing the appropriate bikeway requires answering many questions, such as:

- What is the need for a bikeway at this location?
- Who is the target user?
- What is the land use context?
- What is the roadway context?

The San Antonio District Bicycle Plan and the data it produced provide a foundation for answering many of these questions.

²⁰ Texas Department of Transportation, Roadway Design Manual, Section: 6.4, <http://onlinemanuals.txdot.gov/txdotmanuals/rdw/rdw.pdf>.

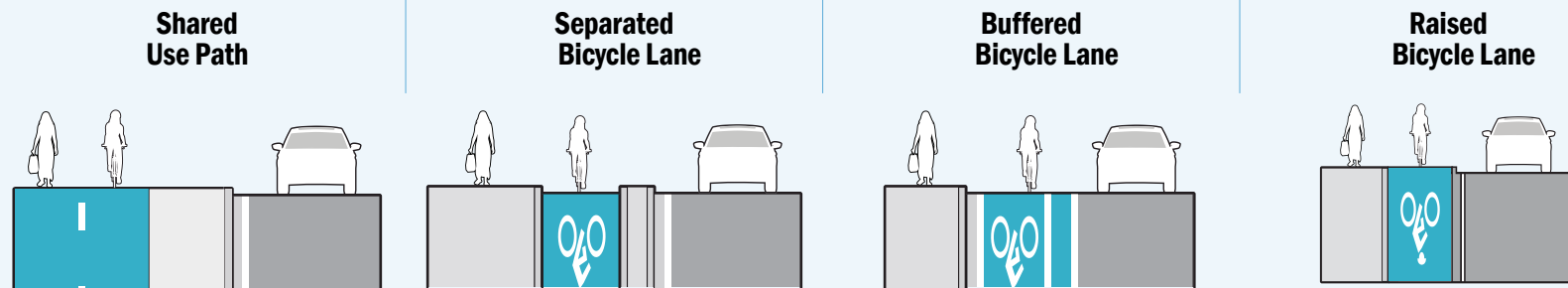
Bikeway Types

There are several bikeway facility types to choose from. The land use and roadway context, bikeway function, and target design user should guide planners and designers to the ideal bikeway type.



Bikeway Types

Different bikeway types serve different target design users. [Section 6.4.4](#) of the Roadway Design Manual describes each bikeway type, applicability, and design considerations.



MORE SEPARATION / PROTECTION
SUITABLE FOR ALL RIDERS

Shared-use paths are shared by pedestrians, bicyclists, and micromobility users. They can be located between the roadway and the ROW line or on an independent alignment with their own ROW. When located along a roadway, they are separated from vehicular traffic by a curb and buffer space. Shared-use paths may be applicable in urban and rural areas.

Separated bicycle lanes are located between vehicles and pedestrians. They are buffered from adjacent vehicular traffic by a horizontal buffer space that includes a vertical element such as a raised median or flexible posts. If on-street parking is present, the people on bicycles are buffered from opening doors. People on bicycles are also separated from people walking by a horizontal buffer space and can include vertical elements. Separated bicycle lanes are applicable in urban areas.

Buffered bicycle lanes are separated from adjacent vehicle traffic or the parking lane by a striped buffer. The buffer is generally only space designated by pavement striping. Buffered bicycle lanes are more suitable in urban environments.

Raised bicycle lanes are at sidewalk level or between street level and sidewalk level to provide vertical separation from vehicular traffic. However, they do not provide horizontal separation. They are an option to consider on roadways where separation is needed and width is constrained. Raised bicycle lanes are suitable in urban environments.

Figure 39. Bikeway User Design Guide Excerpt

EIGHT

Implementation



By pursuing a range of different implementation activities in coordination with statewide TxDOT resources and local partners, the San Antonio District can build momentum across the district and make bicycling a part of its everyday work.

Advancing Bikeway Projects

Bikeways require funding, coordination, and planning to be successfully implemented. Bikeway implementation is sometimes as simple as quick wins, like striping a bicycle lane where sufficient roadway width already exists. In other cases, bikeway implementation can be one component of a larger project that will be years in the making. With the analysis, priorities, and recommendations contained in this plan and TxDOT's Roadway Design Manual, TxDOT staff and partners have all the foundational tools to bring a bikeway project from a planning concept to implementation. There are many actions that can be taken at different stages in the bikeway implementation process to advance comfortable and safe communities for bicycling.

Bikeway improvements on the SHS may be developed and implemented through any of the following avenues.

Bikeway improvements developed and delivered by TxDOT.

- **Improving bikeways as a part of a larger project.** Across the country and in Texas, one of the major ways that bikeways get completed is when a roadway is restored, rehabilitated, or reconstructed. In fact, Title 43 §25.53 of the Texas Administrative Code requires TxDOT to take bicycle accommodation into consideration during the planning and implementation of all construction and rehabilitation projects.²¹ Most TxDOT projects are scheduled and funded as part of the Unified Transportation Program (UTP), which includes 12 different funding programs that draw on a range of state and federal funding sources. The majority of these funding sources can be used to construct bikeways as one part of a larger project. Categories that are more likely to fund larger

roadway projects incorporating bicycling elements include Category 2 – Metropolitan and Urban Area Corridor Projects, Category 4 – Statewide Connectivity Corridor Projects, and Category 12 – Strategic Priority. By consulting the San Antonio District Bicycle Plan when developing UTP projects, TxDOT will be able to identify bicycling needs early in the project development process and consider how best to improve bicycling conditions.

- **Finding dedicated funding for a standalone project.** While relatively few on-system bikeway improvements have advanced as standalone projects, recent federal actions like the passage of the Bipartisan Infrastructure Law have greatly expanded opportunities to directly fund bikeway projects. These include new discretionary grant programs like the Reconnecting Communities and Neighborhoods Grant Program, where states and other eligible applicants compete for funding. They also include funding increases to longstanding programs like the Transportation Alternatives Set-Aside (TA) Program, which the State of Texas receives a set amount of funding to administer. TxDOT's Federal Grants website can help the district and its partners research and pursue federal funding opportunities. The UTP categories that most frequently fund standalone bikeway improvements are Category 5 – Congestion Mitigation and Air Quality, Category 7 – Metropolitan Mobility and Rehabilitation, Category 9 – TA Set-Aside, and Category 10 – Carbon Reduction.
- **Quick-build, maintenance, and pilot projects.** These projects use low-cost materials or regularly scheduled maintenance activities to get bicycle infrastructure built on a short timeline. While local governments were first to advance projects this way, state governments across the U.S. also use this approach. These types of projects are especially helpful where improvements are urgently needed, but the optimal project design may be very expensive or require many years to advance. Examples include restriping roads and bikeways, widening shoulders, or shifting the position of rumble strips to provide an uninterrupted surface for bicycling.

²¹ Roadway Design Manual Sections 6.3 and 6.4 describe requirements and exceptions for providing bikeway accommodations. Note that section numbering may change in future updates.

Bikeway improvements developed in partnership with local governments.

- **Improvements sponsored by local governments.** Cities, counties, and MPOs can work with TxDOT to champion, fund, and even construct bikeway improvements on TxDOT roads that are important to the local community. Projects sponsored by local governments can sometimes use funding sources that may not be available for projects led by TxDOT, such as city bonds or federal funds administered by MPOs. The San Antonio District can help local agency partners understand the process for getting designs and construction plans approved by the state. Detailed guidance can be found in TxDOT's Local Government Projects Policy Manual.
- **Improvements required as a part of private development.** When a developer seeks approval to construct a new building, campus, neighborhood, or other private development, their local government will assess whether the new development will impact public infrastructure like roads and utilities. Local government can also require developer to provide a pedestrian easement so in the future there is space to construct a bike/ped accommodation especially in very limited ROW roadways.. This can include improving bikeways, walkways, intersections, and roads, including on-system elements. Local government staff should coordinate with the San Antonio District when reviewing development proposals that may impact TxDOT facilities.

Advancing Bicycle Tourism Trails (BTT)

The BTT Example Network has been evaluated and updated for the San Antonio District's current needs, leading to new opportunities for collaboration and coordination to implement the BTT. The 2018 study includes recommendations for implementing the network, which can help guide the efforts of the San Antonio District and its partners. The implementation steps noted above also serve as potential pathways to advance the BTT, and the district may identify projects along the BTT that align to identified priority segments. As the San Antonio District designs projects that affect BTT routes, the district and its partners will need to refer to the TxDOT Roadway Design Manual for BTT-specific design requirements, such as bicycle-accessible shoulder widths. The Roadway Design Manual includes detailed design guidance on bicycle facilities suitable for rural and long-distance contexts, such as adequate bikeable shoulders, sidepaths, and the ROW necessary to implement them.

Programs that Support Bicycling

TxDOT, local governments, and nonprofit organizations can also support bicycling through technical assistance, education, and research programs. Developing documents like the Bikeway Design User Guide creates resources that can be used across the state. Programs like Safe Routes to Schools train young people to bicycle safely and engage school communities in mapping bicycling and walking needs around their campuses. Campaigns like #EndtheStreakTX encourage all road users to do their part in making sure everyone—including people bicycling, walking, taking transit, and driving—gets home safe. By collecting and sharing data related to crashes and bicycle counts, TxDOT and its partners support research into how best to support bicycling across the state.



Funding Opportunities

This plan makes the case that improving bikeways will benefit communities throughout the San Antonio District. More than 90% of San Antonio District highway miles include bicycling needs, and even the high-priority locations alone represent substantial investment. To improve the system, TxDOT and its local partners will need to explore the full range of available funding sources.

Competitive Federal Grant Programs

- Active Transportation Infrastructure Investment Program
- Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation Program
- Rebuilding American Infrastructure with Sustainability and Equity
- Reconnecting Communities and Neighborhoods
- Safe Streets and Roads for All

State-Administered Funding

- Federal Lands Access Program (FLAP)
- Unified Transportation Program (UTP), which includes federal formula funding such as:
 - Carbon Reduction Program
 - Congestion Mitigation and Air Quality
 - Highway Safety Improvement Program
 - TA Program
 - Highway Safety Improvement Program (HSIP)
 - Transportation Alternatives Set-Aside (TA) Program
- Enhanced Mobility of Seniors & Individuals with Disabilities (Section 5310)
- Transportation Alternatives Set-Aside Program

Regional Funding

- AAMPO TIP, which includes regional apportionments of federal formula funds

What's Next?

The San Antonio District recognizes that this plan is a first step that, while significant, only begins to address the need for bicycle improvements on the on-system highway network. Planning for a multimodal system is an ongoing process. As more projects are implemented, needs will evolve and change. To understand these changing needs, the San Antonio District will continue to engage local agency partners and stakeholders to create more comfortable conditions for all users, especially those on bicycles.

